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National Air Audit System
FY 1986-1987 National Report

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16. ABSTRACT

The National Air Audit System (NAAS), which was developed jointly by EPA and representatives of State and local air pollution control agencies, was implemented for the first time in FY 1984, and audits were again conducted in FY 1985. The audits covered by this report were performed at State and local agencies over the 2-year period of FY 1986-87, in the areas of air quality planning and State implementation plan activity, new source review, compliance assurance, air monitoring, and inspection and maintenance.

The report for FY 1986-1987 indicates that State and local agencies generally have sound programs in each of the audited areas and the audited agencies show improvement over the previous audits. There are still areas where improvement is needed, however, and various remedial actions have been initiated. A task force is also being formed to assess how to improve the function of the NAAS, to make the audit results more comprehensive and useful.

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FY 1986-1987 National Report

Air Quality Management Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

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CHAPTER 1

OVERVIEW OF AUDIT FINDINGS

Among the major air quality management objectives of the Clean Air Act (CAA) is the requirement to attain the national ambient air quality standards (NAAQS) as expeditiously as practicable, maintain them thereafter, and prevent significant deterioration of air quality that is better than the NAAQS. The CAA imposes the primary responsibility for attaining these objectives on the States. The Environmental Protection Agency (EPA) has a responsibility to overview the State activities and ensure proper program direction. Therefore, the overall goal of the National Air Audit System (NAAS) is to determine if State and local air pollution control programs are achieving the CAA's air quality management objectives.

As was the case with the audit conducted in FY 1985, the FY 1986-87 audit indicated that State and local air pollution control agencies receive high marks in some areas, particularly when considering the difficulty and magnitude of the air quality management task, the limited resources, and the technological limit of the tools available to do the job. The overall assessment, in actually meeting the literal objectives of the CAA, however, shows room for improvement. Although some of the identified deficiencies are minor, there already exist, in some cases, programs at the State or national level to correct the deficiencies. On the other hand, if left unattended, deficiencies such as (1) insufficient resources, (2) absence of a formal emission inventory quality assurance program for ozone extension and SIP call areas, (3) access to and familiarity with ozone models such as EKMA and the Urban Airshed Model, and (4) inadequate enforcement against long-term violators, could threaten the overall effectiveness of some air quality management programs. If the various State and local programs are to improve and become more effective, it is necessary for EPA to (1) identify those activities that make up an air quality management program, (2) specify how those activities are to be conducted pursuant to recognized good practice and within the current resource constraints, (3) compare those activities and practices with what was found during the FY 1986-87 audit program, (4) continue to provide guidance and support on those activities, and (5) seek new sources of revenue to ensure that agencies are properly funded to carry out the objectives of the Clean Air Act.

AIR QUALITY DATA

The starting point for air quality management is collection and analysis of information on the quality of the ambient air. To obtain this information, it is necessary to establish a monitoring network sufficient to collect data representative of the monitored area. The data must then be analyzed to determine whether the air quality is within the prescribed limits of national ambient air quality standards or is in violation of those standards. These steps must be done in an accurate and timely fashion, to determine the need either for protection against significant deterioration by possible new sources or for additional control of existing sources and offsetting emission reductions for new sources.

The FY 1986-87 audit of air quality monitoring data is essentially a repetition of the audit conducted in 1985. Both audits evaluate network design and siting, resources and facilities, data and data management, and quality control. The FY 1986-87 audit showed once again that States have done a commendable job in establishing and operating ambient monitoring networks for criteria pollutants, and that quality data are generally available. The audit indicates that State and local agencies have continued their sucessful performance in operating and maintaining the State and local air monitoring stations (SLAMS) and the national air monitoring stations (NAMS). Approximately 99 percent of the monitors operated by the audited agencies are meeting the design and siting regulations for ambient air monitoring networks. This duplicates almost exactly the 98 percent compliance rate in FY 1985.

The audit results also indicate that 85 percent of the audited agencies need either new or replacement air monitoring or laboratory equipment. This is an increase of 3 percent over the number of agencies needing new or replacement equipment in FY 1985. The total cost of equipment needed is approximately \$2.7 million, with \$1.7 million required for monitoring equipment and \$1 million for laboratory equipment. Even though there is a decrease from FY 1985 of \$1.9 million for total equipment need cost, the amount needed for laboratory equipment remains the same. This finding suggests that data completeness and reliability problems may continue to be encountered if this area does not continue to receive attention.

Similar to prior audits, the FY 1986-87 audit showed that timeliness of data submittal remains a problem for many agencies, particularly for submission of lead (Pb) data. During this audit cycle, approximately 29 percent of the agencies were late with their lead data submittals, compared to 25 percent in FY 1985. The percentages of late submittals for all pollutants ranged from 25 percent for Pb to 10 percent for TSP. Performance in meeting the National Aerometric Air Data Bank (NAADB) 75 percent data completeness criterion showed a range of 16 percent, with a low of 78 percent for NO_2 and a high of 94 percent for lead. In FY 1985, the low was 84 percent for NO_2 and the high was 92 percent for TSP. Another problem area which continues to resurface during each successive audit of agencies' data management is the requirement for submitting the annual SLAMS report. The audit showed that, of the 45 audited agencies required to submit an annual SLAMS report, 9 agencies, or 20 percent, were deficient in one or more of the four elements required in the annual report. Efforts to resolve this problem administratively are continuing, with a slight improvement occurring between the 1985 and 1986-87 audits.

Once again in FY 1986-87, the quality assurance/quality control portion of the audit reports continues to demonstrate good overall performance. Three agencies needed major changes to their quality assurance plans, and

32 had minor revisions pending. With respect to achieving quality assurance goals for data precision (± 15% for all pollutants) and accuracy (± 20% for other criteria pollutants), the only significant problem is with the precision for Pb, for which only 55 percent of the reporting organizations achieved the goal. These figures are nearly identical to those reported in FY 1985, except there is an increase of 9 percent for Pb accuracy for FY 1986-87. The continued inability to meet precision and accuracy goals for Pb over other pollutants is believed to be related to the analysis procedure.

AIR QUALITY EVALUATION

Once air quality data are collected and analyzed, they serve as the foundation for air quality management planning. Due to this important function, the FY 1986-87 audit was once again concerned with the States' ability to perform air quality evaluations. As was the case in FY 1985, the 1986-87 audit investigated (1) States' ability to consider available air quality data systematically for the purpose of disseminating information to the public, (2) States' ability to assess Section 107 redesignations, and (3) State's ability to analyze new violations.

The air quality evaluation portion of the audit shows that 93 percent of States and 75 percent of local agencies made air quality reports available to the public. This is a decrease from the FY 1985 audit, which showed that 98 percent of local agencies made reports available to the public. Sixty (60) percent of the agencies publish annual reports, while 3.5 and 13 percent of the agencies publish semiannual and quarterly reports, respectively. Forty-eight of the agencies reported that they publish reports within 6 months of acquiring the data. This is also down from the FY 1985 audit, in which 80 percent of the agencies were found to publish reports within 6 months of acquiring the data.

Seventy-three (73) percent of the State and local agencies reviewed Section 107 primary and secondary attainment status, as opposed to 83 percent of the agencies reported in the FY 1985 audit. Eighty-two Section 107 reviews were completed that did not result in a request for redesignation, as opposed to 253 reviews in the FY 1985 audit.

Forty-six redesignation actions were initiated (272 initiations in FY 1985) and, of these, 40 actions were completed and submitted to EPA (247 completions and submissions reported in the FY 1985 audit). Approximately 27 percent of these completed and submitted actions resulted in a redesignation from attainment to nonattainment.

Air quality monitoring detected new NAAQS violations at a total of 60 monitoring sites. Of these violations, 41 were at existing monitoring sites and 19 were at newly established sites.

EMISSION INVENTORY

In order to develop a control strategy, it is necessary to relate air quality to source emissions, using such tools as an air quality model. This relationship is possible only with a good emission inventory. Since nonattainment of the ozone and carbon monoxide standards is a significant problem which EPA will have to deal with over the next several years, the

FY 1986-87 audit for emission inventories concentrated on securing inventory information on the status and maintenance of and other problems associated with these pollutants. Fifty-nine control agencies were interviewed and asked to complete a questionnaire on four aspects of their emission inventory program: (1) uses of criteria pollutant emission inventories, (2) volatile organic compound (VOC) inventories in ozone (O_3) nonattainment areas, (3) carbon monoxide (CO) inventories in CO nonattainment areas, and (4) contribution of highway vehicle emissions in O_3 and CO nonattainment areas.

Questions on uses of criteria pollutant emission inventories were designed to determine agency compliance with Clean Air Act requirements to maintain emission inventories to ensure reasonable further progress (RFP) in O_3 nonattainment areas. When looking at these requirements, we find that approximately 75 percent of the RFP areas are being tracked by about 60 percent of the responsible agencies. Similarly, nearly 70 percent of VOC emission inventories have been updated during the last year.

These two facts are good indicators that there is room for improvement in RFP management. Approximately 30 percent of the local agencies currently have a formal quality assurance (QA) program. This strongly suggests the need from Headquarters and the Regional Offices for additional guidance and improved emission factors for some aspects of the inventory program.

When looking at CO emission inventories to determine geographic coverage, we find that adequate CO inventories are being maintained in 85 percent of the CO nonattainment areas. We further find that 37 percent of the agencies include woodstoves in their inventories, and approximately 74 percent of the agencies are using mobile source inventories to locate potential CO hot spots. Most agencies also are utilizing one or more of the recommended techniques (nonreactive VOC, O_3 seasonal temperature) to adjust their VOC inventories.

Investigation of highway vehicle inventories indicates that 53 percent of the inventories are compiled and maintained by other local agencies or by transportation departments. This arrangement appears to be satisfactory, in that most agencies are utilizing approved techniques to adjust their inventories to local conditions and to update their highway inventories.

MODELING

As noted previously, air quality models are used to relate emissions to ambient air quality and, hence, to determine necessary control measures. Because of this relationship, the FY 1986-87 audit focused on the modeling experience and training of agency personnel, and their access to various air quality models. In FY 1986-87, State and local agencies were queried concerning (1) experience and training of agency personnel who conduct modeling; (2) availability of various guideline models, other EPA recommended models, nonguideline models, screening models, and other models; (3) uses of non-EPA recommended modeling techniques; and (4) EPA Regional Office review and revision of modeling applications conducted by the State and local agencies.

Overall, the responses indicate that agency modeling personnel have the educational background to be able to conduct modeling. If experience is taken into account, even those who do not have degrees in meteorology, engineering, or science, or who do not have formal training in modeling, do have experience in modeling. As a result of this combination of education, training, and experience, State and local agency staffs appear to be capable of performing adequate modeling analyses.

State and local agencies generally have access to a wide variety of dispersion models. Most agencies indicate that they are most comfortable with models that predict concentrations of particulate matter, sulfur dioxide, and other nonreactive pollutants from sources located in simple terrain. The agencies tend to have less access to and familiarity with models used to determine the effect of mobile sources and with ozone models such as EKMA and the Urban Airshed Model. Since these models will be the primary ones used in analyses for the post-1987 ozone and CO SIPs, the lack of access to and familiarity with these models may pose a problem for some agencies.

Compared to 20 percent in FY 1985, the FY 1986-87 audit indicated that State and local agencies reported using nonguideline modeling techniques in only about 10 percent of modeling analyses. The most common reason given for using a nonguideline technique was the technical superiority of that method over the one recommended in the guideline. There were also 321 instances of guideline recommendations on the use of data bases not being followed. Of these, 93 percent failed to use 5 years of offsite meteorological data or 1 year of onsite data. These instances may be due to model applications in areas for which there are little or no meteorological data.

There are few cases in which the EPA Regional Office review of the State or local agency modeling analyses led to requiring a revised analysis. It is unclear whether the small number of reviews and revisions was due to the expertise of the agencies or to the fact that few analyses were submitted to the Regional Offices for review.

SIP EVALUATION AND IMPLEMENTATION

The CAA clearly envisions that control agencies would periodically evaluate source/receptor relationships, i.e., the relationships between air quality and source emissions, and would revise their SIP control strategies and resultant emission regulations accordingly. If a State does not act in those situations where the ambient air quality standards are exceeded and the Administrator determines the SIP to be substantially inadequate, the CAA requires EPA to initiate State action by calling for revisions to the SIP. To this end, the FY 1986-87 SIP evaluation and implementation audit was designed to assess whether State plans for attainment are being reasonably carried out and to identify agencies' needs in developing and updating their SIPs. Questions asked during this audit included inquiries on: (1) timeliness of regulatory development, (2) timeliness of studies, (3) transportation control measures, (4) resource activity, and (5) approved generic bubble rules.

While the majority of agencies have made progress in submitting required rules, 29 percent of the SIP revisions approved as part of the SIP control strategy had not been completed and, of those completed, 24 percent were not on schedule. This is a substantial reduction from the 44 percent of SIPs due or overdue and the 27 percent reported on schedule in FY 1985. The audit identified three major causes for these delays: overly optimistic schedules, insufficient resources, and other reasons that were specific to each revision.

One-fourth of the additional studies that the agencies had committed to complete as part of their SIP control strategies had not been completed and, of these studies, 56 percent were behind schedule. These figures show a considerable improvement over FY 1985, when only 50 percent of additional studies were completed and 64 percent were behind schedule.

For transportation control measures (TCMs) to control VOC and CO, it was found that 74 percent (27 percent in 1985) had been implemented for traffic flow improvements, 55 percent for mass transit, 80 percent for carpooling, 89 percent for vehicle inspection/maintenance, and 68 percent for other measures such as bicycle lanes and parking controls.

The audit revealed differences in values between agencies' latest projections of certain air pollution indicators for use in revising SIPs, and the actual levels that had occurred. The absolute differences were 1 percent per year for population growth (in 22 metropolitan areas), 1.8 percent per year for employment projections, 1.8 percent per year for vehicle miles traveled, and 1.4 percent per year for major source emissions. Many respondents contemplated, after finding significant differences between their projections and the actual growth figures, making revisions to upcoming RFP reports or to the SIPs themselves.

Based upon data from the audit, only 18 percent of the States have bubble rules formally approved by EPA. Source emissions in these States dropped overall to rates at or below allowable emission standards after the bubbles were implemented. For the 11 States with bubble rules not formally approved, source emission rates increased, but 67 percent were at rates at or below the allowable emission standards once the bubbles were implemented. However, these States are placing the "impacted" sources in jeopardy of EPA actions to enforce the original SIP limits.

I/M PROGRAMS

The primary purpose of the I/M audit is to allow EPA to ensure that each State or locality is implementing and enforcing its I/M program in a manner consistent with its State implementation plan. Another objective of the audit is to identify areas where EPA can provide assistance to strengthen I/M programs.

During FY 1986-87, EPA conducted 33 program audits. The results of these audits essentially confirmed the validity of findings of the audits performed during FY 1985 and provided further evidence that I/M is a reasonable and effective strategy for reducing motor vehicle tailpipe emissions. In fact, many of the lessons learned from auditing operating I/M programs serve as the basis for EPA's proposed Post-1987 Ozone and Carbon Monoxide Policy.

The FY 1986-87 audit provided convincing evidence that the most effective I/M program design is the centralized design, while decentralized programs with manual analyzers are the weakest. In fact, centralized programs were found to be so superior in identifying failing vehicles and achieving emission reductions required by EPA that EPA requested corrective action from the Governors of seven States having decentralized programs. Other problems that resurfaced in the FY 1986-87 audit were associated with high waiver rates, ineffective use of program data for program management, lack of quality control and consistency of testing in decentralized programs, enforcement in sticker enforced programs, and the use of license or registration suspension as a measure of enforcement.

As reported in the FY 1985 audit, the resolution of certain problems generally rests with each I/M program. Current audit results clearly indicate that differently designed programs do not realistically have equal benefit potential. Resolution of certain problems rests in changing program design. It is unlikely that additional monitoring or administrative control will be sufficient to resolve problems associated with decentralized manual inspections. The audit results also indicated that decentralized tampering inspections may lack the impartiality, consistency, and accuracy needed to achieve sufficient benefits. Given the strength of the audit findings, EPA favors the centralized program design and believes that registration denial enforcement is more effective than sticker based systems.

The audit results clearly identify the need for EPA to continue to work with each State or local I/M program to address problems identified during the audits. In addition, EPA should give a high priority to conducting I/M audits on the remaining programs as soon as possible.

NEW SOURCE REVIEW

The CAA anticipates that review of new sources by the States will be one of the main mechanisms by which States attain and maintain the NAAQS and prevent significant air quality deterioration. A State's new source review (NSR) program must be designed and implemented to prevent a new source from aggravating an existing air quality problem or creating a new problem where one does not already exist. The FY 1986-87 audit verified that State and local agencies are generally familiar with, and strongly support, the preconstruction review process.

These audit findings support, and oftentimes amplify, the findings from the FY 1985 NSR audit. The findings indicate that most agencies perform their overall NSR program responsibilities reasonably well, although, in a number of State and local agencies, problems were identified with respect to the consistent and adequate application of certain specific program requirements. Nonetheless, auditors occasionally mentioned that improvements were observed in the performance of some agencies where specific deficiencies had previously been found. This is certainly to the credit of these agencies' efforts to improve in-house performance and to contribute to a greater level of consistency nationwide. Overall, however, EPA auditors often cited the lack of adequate file documentation as a hindrance to a complete evaluation of the agencies' permit review procedures. With respect to specific audit topics, EPA continued to find significant problems with the way many agencies carried out their source applicability determination procedures; in some instances, with the lack of thorough ambient air quality impact analyses and inconsistency in the methods used to require operating limitations on new and modified sources. The audit once again noted the overall tendency of agencies to rely on New Source Performance Standards (NSPS) in defining best available control technology (BACT). The audit also confirmed that agencies typically are willing to allow prevention of significant deterioration (PSD) applicants to use existing data in lieu of new monitoring data, but it raised a new concern when EPA found that the basis for such actions was not always well documented or in complete conformance with existing EPA criteria for representative data.

Yet, despite the assortment of problems identified in the audits, it is still fair to say that most State and local agencies function in a competent manner, with each agency having its own individual strong points. For example, some agencies routinely extend the requirement for BACT to non-PSD sources, or require BACT for all pollutants once it is determined to be required for any pollutant. The focus on permit files demonstrated that most agencies are more prone to internal inconsistencies than to routine malpractice. While not always true, auditors were usually able to find good examples along with the bad whenever selected permit files were examined.

COMPLIANCE

Ultimately, the success of a State's air quality management program relies on its ability and will to enforce its regulations. Many State and local agencies showed one or more strong points characteristic of a successful air compliance program, such as high source compliance rates supported by high inspection frequency rates, performance of all required NSPS source tests, expeditious resolution of violations, and few long-term violators. Other States had source files that were for the most part well organized, up-to-date, and complete, reflecting a reasonable profile of each source. These positive points show that most States are fulfilling compliance and enforcement responsibilities under the CAA.

Inspection rates for Class A1* SIP sources decreased over those reported in the FY 1985 audit (87 to 84 percent), and five States had unacceptably low inspection rates of less than 60 percent. Compliance rates for Class A1 SIP sources remained roughly the same as in FY 1985 (91 to 92 percent). The NSPS national figures for both inspection and compliance rates rose (88 to 90 percent and 90 to 93 percent, respectively), even though the rates in some States declined. The NSPS inspection rates for nine States are unacceptably low, with figures of less than 60 percent. National Emission Standards for Hazardous Air Pollutants (NESHAP) inspection rates showed an increase (from 67 to 96 percent), while compliance rates fell slightly (from 93 to 90 percent). Twelve States have NESHAP inspection rates at or below 60 percent. The audit results show that performance did not change significantly from the 1985 audit. In the coming fiscal year, it is expected that State and local agencies will continue to work toward further improvement in the compliance of sources.

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* Class A1 includes sources with actual or potential controlled emissions greater than or equal to 100 tons per year.

The FY 1986-87 audit also revealed that several State and local agencies, to a varying extent, still have weaknesses in three areas vital to a strong and effective compliance program. First, source files maintained by some agencies do not contain verifiable information reflecting a reasonable profile of each source. This is evidenced by the 7 percent reduction in the number of source files having adequate verifiable information since FY 1985. Even so, some audit reports cited improvements since the FY 1985 audits in the condition of State files. Second, some inspection reports still are of poor quality (no mention of operating or emission parameters, or pollutants emitted), and this is a significant concern. Third, although overall there was a slight increase in the percentage of audit reports indicating that sources were being expeditiously returned to compliance (from 74 to 77 percent), some of the reviewed agencies' enforcement efforts are not always effective in reducing the number of long-term violators by expeditiously returning documented violators to compliance.

Thus, while there have been improvements in the aforementioned three areas, some State and local agencies need to heighten efforts in these critical areas. Success in these areas is vital to the establishment and maintenance of State and local agency credibility with EPA and the public.

NEXT STEPS

The EPA Regional Offices are now in the process of working with the State and local agencies to correct those deficiencies that were identified in the FY 1985 audit. They will continue this effort into FY 1989. In addition, EPA intends to use the results of the FY 1986-87 audit in its program planning and budgeting cycle to assure that resources are directed to areas of highest need.

The National Air Audit System is intended to focus on State and local air quality management programs, identifying program deficiencies and defining actions necessary to bolster the programs to make them more responsive to environmental needs. Past audit reviews indicate that there are some inherent weaknesses in the NAAS, both in how audits are conducted and in how audit results are utilized. This is especially true for the Air Quality Evaluation and SIP Evaluation and Implementation sections of the NAAS. Consequently, a task force is being formed to assess the current NAAS and make recommendations for changes. Special emphasis will be placed on making the system more audit-oriented and less survey-oriented. The task force will also attempt to make the audit results more useful to audit participants.

CHAPTER 2

INTRODUCTION

The National Air Audit System (NAAS) was developed in 1983 through a joint effort of the State and Territorial Air Pollution Program Administrators (STAPPA), the Association of Local Air Pollution Control Officials (ALAPCO), and EPA. The NAAS provides uniform national criteria for evaluating (auditing) State and local air pollution control programs. Such nationally applicable criteria minimize inconsistency in program audits carried out by EPA's 10 Regional Offices.

The need for the NAAS evolved as State and local air pollution control agencies assumed responsibility under the Clean Air Act (CAA) for an increasing number of programs. The EPA responded to the concerns of STAPPA and ALAPCO members by agreeing to participate in a STAPPA/ALAPCO/EPA workgroup. The workgroup set forth to develop and direct the implementation of an auditing system that would ensure the desired national consistency and confirm that State and local air pollution control programs were operating in such a manner as to satisfy the national requirements of the CAA.

The workgroup decided that the primary goals of the NAAS should be to identify any obstacles that are preventing State and local agencies from implementing an effective air quality management program and to provide EPA with information that can be used to develop more effective and meaningful national programs. The NAAS should provide audit guidelines that EPA and State and local agencies can use to (1) meet statutory requirements; (2) assist in developing an acceptable level of program quality; (3) account for the achievements, shortcomings, and needs of various air programs; (4) identify programs needing further technical support or other assistance; and (5) manage available Federal, State, and local resources effectively so that the national ambient air quality standards (NAAQS) are attained and maintained as expeditiously as possible.

The first audit covered four program areas selected by the workgroup: air quality planning and SIP activity, new source review, compliance assurance, and air monitoring. Standardized audit guidelines for each program area were written by subcommittees appointed by the workgroup. Each subcommittee was chaired by a State agency representative, with an EPA staff person serving as coordinator. Local agencies and the EPA Regional Offices were also represented on each subcommittee. The workgroup developed the protocol for implementing the audit guidelines written by subcommittees.

These guidelines were used for conducting the first NAAS audits in FY 1984 (ending September 30, 1984). A national report (EPA-450/2-84-009) that summarized the results of the 68 audits performed the first year was issued in December 1984. The audit guidelines were revised for FY 1985 and vehicle inspection/maintenance was added as a fifth program audit area.

The guidelines were used by EPA Regional Offices in FY 1985 to audit 66 State and local air pollution control programs, including all States except California. In addition, Puerto Rico, the Virgin Islands, and the District of Columbia were included in the audit. The California State agency was not audited because the local district agencies in California are responsible for implementing the various air quality management programs. The local agencies audited were:*

Allegheny County, PA
Asheville, NC
Fresno County, CA
Jacksonville, FL
Lane County, OR
Nashville, TN
Northwest APA, WA
Philadelphia, PA
South Coast AQMD, CA
Southwest APCA, WA
St. Louis, MO
Tampa, FL
Toledo, OH
Wayne County, MI

The STAPPA, ALAPCO, and EPA encouraged State/local personnel from one agency to serve as members of the audit team for another agency. Four States participated in this activity in FY 1985. The agencies that participated in the audit exchanges listed the following benefits of the program:

> It provides an opportunity to compare their agencies' programs with the host State's program to see what improvements can be "transplanted."
>
> It fosters communication with other agencies at the working level so that common problems can be shared.
>
> It provides general insight into what other agencies are doing.

All of the participating agencies indicated that the exchanges were beneficial and that they would continue their participation in the future if resources allow. Such audit team exchanges apparently offer an excellent opportunity to learn firsthand how other States operate their programs.

The audit teams varied in size; the number of auditors in an agency at any one time rarely exceeded five. All five of the program areas were generally not audited at the same time. Also, all program areas were not audited in each agency because the five activities selected for audit were not performed by all agencies.

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*Additional local agencies were included in the air monitoring audits because of the delegated responsibility of operating local air monitoring networks.

The EPA Headquarters personnel observed 10 audits in FY 1985. This served to provide national overview on the audits and was part of the quality assurance program to which STAPPA/ALAPCO and EPA had agreed.

The protocol followed by the Regional Offices in conducting the audits included advance preparation prior to the on-site visit, an initial meeting with the agency director, discussions with agency staff, review of the agency files, and an exit interview.

The advance preparation involved, among other things, sending a letter to the agency well in advance of the audit to confirm the date and time and to identify the individuals performing the audit. The guidelines and questionnaires were also provided to the agencies with a request to complete portions thereof and return them to the EPA Regional Offices at least 2 weeks before the scheduled visit.

The site visits generally were conducted in four phases:

- The audit team met with the agency director and key staff to discuss the audit goals and procedures to be followed.
- The auditors discussed the questionnaire with the personnel in charge of each of the five audited activities.
- The agency files were reviewed to verify the implementation and documentation of required activities.
- An exit interview was held to inform agency management of the preliminary results of the audit.

The Regional Offices drafted an audit report after each site visit and requested that each audited agency review it. The individual agency audit reports are used by EPA to compile and write each audit cycle report.

With only minor deviations, the FY 1986-87 audit continued the NAAS objective of investigating the ability of State and local air pollution control programs to achieve their air quality management objectives. The FY 1986-87 audit contained a number of improvements over previous audits. Among the FY 1986-87 improvements were:

- A curtailment on audit topics for local agencies and agencies with I/M programs. For local agencies, only those topics for which the specific implementing authority rests with the local agency received an audit. Only those agencies with I/M programs that had been ongoing for 1 year or more were considered for an I/M audit.
- To even out audit workloads on the State and local agencies and the EPA auditors, STAPP/ALAPCO and EPA agreed that the NAAS effort would be conducted biannually. Each EPA Region would be responsible for ensuring that all State agencies and selected local agencies are audited within the 2-year period. Instead of designated dates for the completion of an audit, the FY 1986-87 audit was tied to the Strategic Planning and Management System (SPMS).

Under SPMS, the Regional Office must forward a final audit report to OAQPS within 180 days after the audit is completed.

- Questions other than those contained in the audit manual could be appended only with the advance consent (at least 30 days) of the audited agency. It was also made clear that this restraint did not preclude a Regional Office from inquiring about deficiencies that surfaced during the audit.

CHAPTER 3

AIR QUALITY PLANNING AND SIP ACTIVITIES

3.1 EXECUTIVE SUMMARY

Four major program components within the air quality planning and SIP activities area were evaluated in the FY 1986-87 audit. These components were air quality evaluation, emission inventories, modeling, and SIP evaluation.

This section of the audit was again in the form of survey questions that were presented to the audited agencies prior to the on-site visit. In some instances, the questionnaires were verified upon review of selected program files.

In summary, the FY 1986-87 audit revealed that the majority of the audited agencies have sound programs in most of these components, but there is still room for improvement.

Air Quality Evaluation

This portion of the audit covers how air quality data are used by State and local agencies for the purpose of Section 107 redesignations, trends analyses, prioritization of air program activities, and public information. Three main areas are covered: (1) air quality reports, (2) Section 107 redesignations, and (3) new violations.

Ninety-three (93) percent of States and 75 percent of local agencies made air quality reports available to the public. This is a decrease from the FY 1985 audit, in which 98 percent of local agencies made reports available to the public. Over one-half of the agencies publish semiannual and quarterly reports, respectively. Forty-eight (48) percent of the agencies reported that they publish reports within 6 months of acquiring air quality data. This number is down from the FY 1985 audit, when 80 percent of the agencies published their reports within 6 months of acquiring the data.

Forty-six redesignation actions were initiated (272 initiations in FY 1985) and of these, 40 actions were completed and submitted to EPA (247 completions and submissions reported in FY 1985 audit). Approximately 27 percent of these completed and submitted actions resulted in a redesignation from attainment to nonattainment.

Air quality monitoring detected a total of 60 new violations. Of these, 41 were at existing monitoring sites and 19 were at newly established sites.

Emission Inventory

Fifty-nine control agencies were interviewed and asked to complete a questionnaire on four aspects of their emission inventory program: (1) uses of criteria pollutant emission inventories, (2) volatile organic compound (VOC) inventories in ozone (O_3) nonattainment areas, (3) carbon monoxide (CO) in CO nonattainment areas, and (4) highway vehicles in O_3 and CO nonattainment areas.

When looking at criteria pollutant emission inventories to determine compliance, we find approximately 75 percent of the RFP areas are being tracked by about 60 percent of the responsible agencies. Furthermore, it appears that the majority of VOC emission inventories have been updated during the last year.

These two discoveries indicate room for improvement in RFP management. Only approximately 30 percent of the local agencies currently have a formal quality assurance (QA) program. Audit results strongly suggest the need for additional guidance and improved emission factors for certain aspects of the inventory program.

Adequate CO emission inventories are being maintained in 85 percent of the CO nonattainemnt areas. Most agencies are utilizing one or more of the recommended techniques (nonreactive VOC, O_3 seasonal temperature) to adjust their VOC inventories. Thirty-seven (37) percent of the agencies include woodstoves in their inventories, and approximately 74 percent of the agencies are using mobile source inventories to locate potential CO hot spots.

Investigation of highway vehicle inventories indicates that 53 percent of the inventories are compiled and maintained by local agencies or transportation departments not usually involved in air pollution control. This arrangement appears satisfactory, since most agencies use approved techniques to adjust their inventories to local conditions and to update their highway inventories.

Modeling

For FY 1986-87, State and local agencies were queried concerning (1) experience and training of agency personnel who conduct modeling, (2) availability of various guideline models, other EPA recommended models, nonguideline models, screening models, and other models, (3) uses of non-EPA recommended modeling techniques, and (4) EPA Regional Office review and revision of modeling applications conducted by the State and local agencies.

The audit indicated that most agencies are knowledgeable and capable of performing and reviewing routine modeling analyses. If experience is taken into account, even personnel who do not have degrees in meteorology, engineering, or science, or no formal training in modeling, do have experience in modeling.

State and local agencies generally have access to a wide variety of dispersion models and feel most comfortable with those that predict concentrations of particulate matter, sulfur dioxide, and other nonreactive pollutants from sources located in simple terrain. Agencies tend to have less access to, and familiarity with, models used to determine impacts from mobile sources and ozone models such as EKMA and the Urban Airshed Model.

Compared to 20 percent in FY 1985, the FY 1986-87 audit indicated that State and local agencies reported using nonguideline modeling techniques in only about 10 percent of modeling analyses. The most common reason given for using a nonguideline technique was the technical superiority of that method over the one recommended in the guideline. There were also 321 instances of guideline recommendations on the use of data bases not being followed. Of these, 93 percent failed to use 5 years of offsite meteorological data or 1 year of onsite data. There are few cases in which the EPA Regional Office review of State or local agency analyses revealed the need for a revised analysis.

SIP Evaluation

The FY 1986-87 SIP evaluation portion of the audit was designed to assess whether State plans for attainment are being reasonably carried out and to identify agency needs in developing and updating their SIPs. Questions asked during this audit included inquiries on: (1) timeliness of regulatory development, (2) timeliness of studies, (3) transportation control measures, (4) source activity, and (5) approved generic bubble rules.

While the majority of agencies have made progress in submitting required rules, 29 percent of the SIP revisions approved as part of the SIP control strategy had not been completed, and of those completed, 24 percent were not on schedule. This is a substantial reduction from the 44 percent of SIPs uncompleted and the 43 percent not on schedule in FY 1985. The audit identified three major causes for these delays: overly optimistic schedules, insufficient resources, and other reasons specific to particular revisions.

One-fourth of the additional studies that the agencies had committed to complete as part of their SIP control strategies had not been completed and, of these studies, 56 percent were behind schedule. These figures show a considerable improvement over FY 1985 when only 52 percent of additional studies were completed and 64 percent of the remaining studies were behind schedule.

For transportation control measures (TCMs) to control VOC and CO, it was found that 74 percent (27 percent in 1985) of the traffic flow improvements, 55 percent of mass transit, 80 percent of carpooling, 89 percent of vehicle inspection/maintenance, and 68 percent of the remaining measures had been implemented.

The audit revealed differences in values between growth projections for SIP planning and the actual growth that occurred. The absolute differences were 1 percent per year for population growth (in 22 metropolitan areas), 1.8 percent per year for employment projections, 1.8 percent per year for vehicle miles traveled, and 1.4 percent per year for major source emissions. Many respondents, after finding significant differences between their projections and the actual growth figures, contemplated making revisions to upcoming RFP reports or to the SIPs themselves.

Based upon data from the audit, only 18 percent of the States have bubble rules formally approved by EPA. Source emissions in these States dropped overall to rates at or below allowable emission standards after the bubbles were implemented. For the 11 States with bubble rules not formally approved, source emission rates increased, but 67 percent were at rates at or below the allowable emission standards once the bubbles were implemented. Nonetheless, these States are placing the "impacted" sources in jeopardy of EPA actions to enforce the original SIP limits.

3.2 AIR QUALITY EVALUATION

Introduction

The National Air Audit is one of EPA's mechanisms for measuring the effectiveness of State and local air pollution control programs and identifying the need for Federal assistance to support such programs. The audit program is divided into five categories, which include: Air Monitoring, Air Quality Planning and SIP Activities, New Source Review, Compliance Assurance, and Vehicle Inspection/Maintenance. At the conclusion of each audit period, EPA analyzes the audit data gathered by EPA Regional "auditors" and publishes a document that summarizes the findings, identifies the major issues, and recommends solutions to specific problems.

This section contains detailed information on how air quality data are used by State and local agencies for the purpose of Section 107 redesignations, trends analyses, prioritization of air program activities, and public information. Three main areas are covered: air quality reports, Section 107 designations, and new NAAQS violations. The total number of agency respondents was 61.

In the air quality reports area, the audit determined how frequently agencies published air quality monitoring data, the contents of the air quality reports, and the time lag between data acquisition and publication.

The second area focused on how Section 107 attainment status designations were being reviewed and changed. The number of redesignations and methods used to review attainment status were also requested in the questionnaire.

The intention of the third area was to determine the number of air monitors that revealed any new violations and the type of action taken for each violation.

Major Findings and Conclusions

Air Quality Reports

The air quality evaluation portion of the audit showed that 93 percent of State agencies and 75 percent of local agencies made air quality reports available to the public. This indicates a decrease from the FY 1985 audit, in which 98 percent of local agencies made reports available to the public. Sixty (60) percent of the agencies publish annual reports, while 3 and 13 percent of the agencies publish semi-annual and quarterly reports, respectively.

Forty-eight (48) percent of the agencies reported that they publish reports within 6 months of acquiring air quality data. This is also down from FY 1985, when 80 percent of the agencies published reports within 6 months of acquiring the data.

Section 107 Designations

Seventy-three (73) percent of the State and local agencies reviewed Section 107 primary and secondary attainment status designations, versus 83 percent reported in the FY 1985 audit. Eighty-two Section 107 reviews were completed that did not result in a request for redesignation, as opposed to 253 reviews in the FY 1985 audit.

Forty-seven redesignation actions were initiated (272 in FY 1985) and, of these, 40 actions were completed and submitted to EPA (247 completions and submissions reported in the FY 1985 audit). Approximately 27 percent of these completed and submitted actions resulted in a redesignation from attainment to nonattainment.

New Violations

Air quality monitoring detected a total of 60 new NAAQS violations. Of these, 41 were at existing monitoring sites and 19 were at newly established sites. The most common action taken in these cases was a microscopic examination of filters.

Responses to Individual Questions

Air Quality Reports

The purpose of this audit section was to determine: (1) the extent to which State and local agencies make air quality reports available to the public, (2) the contents of the air quality reports, and (3) the time lag between data acquisition and report publication. The specific questions asked are summarized in Table 3.1.

The audit determined that 37 of the 40 reporting State agencies (93 percent) and 15 of the 20 local agencies (75 percent) make air quality reports available to the public. In comparison to the FY 1985 audit, the percentage of State agencies providing air quality reports to the public remains constant; however, the number of local agencies that provide reports to the public was down 15 percent from the previous audit.

While there is no specific requirement or commitment for agencies to issue air quality reports in a timely manner, EPA sought to determine in the audit the frequency of such reports and the time lag between data acquisition and the release of the reports. Of the 60 reporting agencies, 26 agencies (60 percent) publish reports annually, 2 agencies (3 percent) publish reports semi-annually, 8 agencies (13 percent) publish quarterly reports, and 4 agencies (7 percent) publish reports on a monthly basis.

TABLE 3.1

SPECIFIC QUESTIONS REGARDING AIR QUALITY REPORTS

Question	Yes		No		Not Answered	
	Number of Agencies	Percent	Number of Agencies	Percent	Number of Agencies	Percent
Did the report indicate whether data shown have been quality assured according to EPA guidelines?	35	58	15	25	10	17
Did the report cover all criteria pollutants?	46	77	5	8	9	15
Did the report cover all monitors within the agency's jurisdiction?	50	83	1	2	9	15
Did the report describe the completeness of the data collected during the reporting period?	39	65	10	17	11	18
Did the report indicate comparisons to NAAQS on an appropriate basis (i.e., expected exceedances for ozone and highest 2nd high for CO, etc.)?	48	80	3	5	9	15
Did the report summarize historical air quality data by year since the start of the monitoring program in that area?	31	52	19	32	10	16
Did the report present maps of the nonattainment areas and maps depicting the locations of the ambient monitors?	33	55	15	25	12	20
Did the report describe each of the pollutants?	36	60	1	23	10	17
Did the report briefly describe each of the sampling techniques?	39	65	11	18	10	17

All but three of the reporting agencies publish air quality reports within 12 months of acquiring the data. Three of the agencies (59 percent) reported a 0 to 2 month lag time, 26 agencies (43 percent) reported a 3 to 6 month lag time, and 19 agencies (32 percent) reported a 7 to 12 month lag time. Nine of the agencies did not respond to the question.

Section 107 Attainment Status Designation

The audit determined that 44 State and local agencies (73 percent) systematically reviewed Section 107 primary and secondary attainment status designations and submitted proposed changes to EPA. This figure is somewhat lower than the 83 percent determined in the FY 1985 audit. Fifteen of the 60 agencies (25 percent) did not review Section 107 attainment status designations and one of the agencies (2 percent) did not respond to the question.

The audit showed that 82 Section 107 reviews were completed that did not result in a request for redesignation. This is considerably lower than the 253 reviews reported in the FY 1985 audit.

Forty-seven redesignation actions were initiated and, of these, 40 actions were completed and submitted to EPA. A breakdown of the results is presented in Table 3.2. Again, these numbers are considerably lower than the 272 initiations and the 247 completions and submissions reported in the FY 1985 audit. Of the 40 submitted actions, EPA has published final rulemaking for all redesignations to nonattainment, 20 redesignations from nonattainment to attainment or unclassifiable, and 4 redesignations from unclassifiable to attainment.

The methods used by the agencies to review attainment status are shown in Table 3.3. Five methods were considered: (1) staff notification of violations to agency management, (2) consideration of air quality data for the last 2 or 3 years, (3) consideration of modeled exceedances, (4) consideration of method control and emission changes, and (5) investigation into causes of violations. The method most commonly used was consideration of recent air quality data (used by 87 percent of the reporting agencies). Consideration of modeled exceedances was used the least of the five methods (used by 48 percent of the reporting agencies).

The audit showed that there were 10 attainment or unclassified areas under a "call for SIP revision". Three agencies intended to submit a request for redesignation to nonattainment for these areas.

New Violations

The purpose of this section of the audit was to determine the number of new violations of the NAAQS that occurred during the 1985 to 1986 period, and how the agencies dealt with these violations. A new violation is defined as a violation at a monitoring site that had been violation-free for the previous 3 years. The following are actions that were taken by the agencies in response to a violation:

TABLE 3.2

AREA REDESIGNATIONS BY STATE AND LOCAL AGENCIES

Type of Redesignation	Initiated	Completed & Submitted
Attainment to nonattainment*	4	4
Nonattainment to attainment or unclassifiable	25	20
Primary nonattainment to secondary nonattainment	10	10
Secondary nonattainment to primary nonattainment	3	2
Unclassifiable to attainment	5	4
Unclassifiable to nonattainment (e.g., PM_{10}, SO_2, & NO_x)	0	0
Total	47	40

* For O_3 or CO, an "attainment" designation also includes "unclassifiable."

TABLE 3.3

METHODS USED TO REVIEW ATTAINMENT STATUS

Method	Yes		No		Not Answered	
	Number of Agencies	Percent	Number of Agencies	Percent	Number of Agencies	Percent
Staff notification of violations to agency management	45	75	4	7	11	18
Consideration of air quality data for the last 2 to 3 years	52	87	0	0	8	13
Consideration of modeled exceedances	29	48	19	32	12	20
Consideration of method control and emission changes	38	63	11	18	11	18
Investigation into causes of violations	41	68	8	13	11	18

Microscopic laboratory examination of filters
Additional monitoring
Data ignored (documented exceptional event)
Enforcement action based on existing SIP regulation
Source-specific, local, county, or areawide SIP revision
Verification by modeling studies
Change in an individual source permit
Other action

If no response was given by a reporting agency, it was assumed that no action was taken.

The results of this audit section are presented in Table 3.4. A total of 41 new violations at existing air monitoring sites were reported in this audit. In the majority of instances, these violations were dealt with by the agency in the following ways: by a microscopic examination of filters (22 percent), data were considered to be the result of a documented exceptional event and were ignored (22 percent), or by some other means (24 percent).

Nineteen violations were reported at newly established sites. Of these, 37 percent were dealt with by microscopic examination of filters, and 27 percent were followed up with additional monitoring.

3.3 EMISSION INVENTORY

Introduction

Fifty-nine control agencies were interviewed and asked to complete a questionnaire on four aspects of their emission inventory programs:

1. Uses of criteria pollutant emission inventories

2. Volatile organic compound (VOC) inventories in ozone (O_3) nonattainment areas

3. Carbon monoxide (CO) emission inventories in CO nonattainment areas

4. Highway vehicle inventories in O_3 and CO nonattainment areas.

There are 63 State implementation plans (SIPs), but 4 agencies do not operate significant inventory programs. Hence, 44 State, 13 local, and 2 territorial programs were involved in this audit.

It is not coincidental that all four of the interview subjects deal at least in part with O_3 and/or CO nonattainment. Nonattainment of ambient air quality standards for these two pollutants is a significant problem that EPA must expect to deal with for the next several years. A complete, current emission inventory is an essential starting point in developing programs and strategies for reducing the ambient concentrations of O_3 and CO in nonattainment areas. Therefore, the 1986-87 National Air Audit System program for emission inventories has been directed at obtaining information on the status, maintenance, and associated problems

TABLE 3.4

ACTIONS TAKEN FOLLOWING AIR QUALITY MONITORING VIOLATIONS

Action	New Violations at Existing Sites	Violations at Newly Established Sites
Microscopic examination of filters	9	7
Additional monitoring	4	6
Data ignored due to a documented exceptional event	9	0
Enforcement action based on existing SIP regulations	6	1
Source-specific, local, county, or areawide SIP revisions	2	1
Verification by modeling studies	0	2
Change in an individual source permit	1	0
Other	10	2
Total	41	19

of O_3 and CO nonattainment emission inventories. It should be pointed out that approximately 50 percent of the agencies participating in this program were audited in each of the last 2 years. The audit does not represent a status of the program at one point in time, so some types of comparisons may be inappropriate.

Major Findings and Conclusions

The reasonable further progress (RFP) tracking process for O_3 nonattainment areas is being carried out for approximately 75 percent of the RFP areas by about 60 percent of the agencies responsible. Similarly, it appears that 60 to 70 percent of VOC emission inventories have been updated during the last year.

These two facts suggest that improvement is needed in the RFP management area. Only about 30 percent of the local agencies have a formal quality assurance (QA) program, and so this area should receive additional attention from both Headquarters and the Regional Offices. Clearly, a need is indicated for better guidance and improved emission factors for some aspects of the inventory program. Most agencies are utilizing the EPA-recommended techniques (e.g., nonreactive VOC, O_3 seasonal temperature) to adjust their VOC inventories.

CO emission inventories are maintained, to one degree or another, for 85 percent of the CO nonattainment areas. In addition to inventories of CO emissions, 74 percent of the agencies are using traffic inventories to locate potential CO hot spots.

The audit questionnaire results indicate that 53 percent of the highway vehicle inventories are compiled and maintained by a local agency or transportation department not usually involved in air pollution control. Most of the air pollution agencies that do not maintain the highway inventory themselves have found this arrangement acceptable, generally because resources or expertise are lacking within the air agency itself. Most agencies are utilizing approved techniques to adjust their inventories to local area conditions. An analysis of the responses indicates that at least 60 percent of the highway inventories (transportation data, vehicle miles traveled, etc.) have been updated within the last 2 years.

Responses to Individual Questions

To facilitate discussion of the results and conclusions of the audit, a composite of the questionnaires is included for each of the four aspects of the inventory section. The composite questionnaire is highlighted by double indentation and a vertical line along the left margin throughout the report. In general, the number of agencies responding to each of the four sections was dependent on their attainment status. This number is in parentheses directly below the section title.

There has been no attempt in the composite questionnaire to summarize all of the "other" responses. Also, Regional Office comments are not reflected on the composite form. Nearly all Regional Office comments either confirmed the agency response or elaborated on needs the agency cited.

Section B.1. Uses of Criteria Pollutant Emission Inventories

This section was intended to determine agency compliance with the Clean Air Act requirements to maintain emission inventory data to ensure RFP in O_3 nonattainment areas. In addition to the information concerning RFP areas, this section obtained information about other uses of inventories, quality assurance, and what EPA can do to improve emission inventories.

B.1. Uses of Criteria Pollutant Emission Inventories (28 agencies)

Emission inventories are used in a number of applications by air pollution control agencies, including the demonstration of reasonable further progress (RFP) in O_3 nonattainment areas. The following questions deal with the uses of emission inventories by your agency.

State/local Agency Response

a. RFP Toward Attainment of O_3 Standards[1]

The Clean Air Act requires SIP's to provide for maintenance of emission inventories to ensure RFP. In the past year, did your agency actually track and compare changes in the VOC emission inventories with projected changes in emissions given in the respective O_3 curves in the SIP's? Check yes or no for each nonattainment area listed below. If no, insert the letter code best representing the reason RFP is not tracked.

Areas where O_3 RFP should be tracked:	Yes	No
(Regional Office to provide list)		
[28 agencies responsible for 43 RFP areas]		
Agencies:	19	9
RFP areas:	31	12

Reasons listed by agencies: A-2, B-2, C-4, D-1, E-5

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[1] This question applies only to those areas specified by the Regional Office as O_3 extension areas and areas where EPA has called for SIP revisions. (EPA Regional Offices must provide a list of these areas.) Note that RFP tracking means compiling a realistic estimate of an individual year's emissions and comparing this to the appropriate year in the SIP RFP curve. Merely compiling air quality data trends as an alternative to compiling emissions data is not accepted as RFP tracking.

CODE

A. Alternative tracking mechanisms are used (e.g., air quality data), not directly involving emission inventories

B. RFP tracking is not considered a priority task

C. Insufficient resources available to track RFP by maintaining an up-to-date emission inventory

D. Insufficient guidance available on how to do RFP tracking

E. Other (specify)______________________________

b. RFP Report: If "yes", did your agency, in the past year:

1. Prepare a report on RFP? 16 yes 12 no
(26 reports, prepared by 16 agencies)

2. Submit the report to EPA? 16 yes 12 no

3. Make the report available for public comment?
10 yes 6 no

For EPA Regional Office response:

4. Has the RO received the above reports?
26 yes ___ no

5. If "yes", has the RO commented or otherwise responded to the State or local agency?
18 yes 8 no (reports)

6. Are you assured that any progress indicated is the result of real emission reductions rather than changes in methodologies, emission factors, etc.?
21 yes 5 no RFP areas

c. RFP Emission Inventory Update: For each of the areas where O_3 RFP should have been tracked in the past year, what approximate percentage of VOC emissions in the inventory was updated for the major, minor, and mobile source categories that year? The areas are the same as those listed by the Regional Office in Question a. Use one of the following percent ranges in the table:

0-19 percent, 20-39 percent, 40-59 percent,
60-79 percent, 80-100 percent

Number of RFP Areas

Areas where O_3 RFP should be tracked. See question a.	Stationary Sources						Mobile Sources	
	Major		Minor					
			Regulated		Unregulated			
	%	RO*	%	RO*	%	RO*	%	RO*
Percentage Range of VOC Inventory Updated								
1. 0- 19	4		5		10		9	
2. 20- 39	0		6		9		0	
3. 40- 59	1		2		1		1	
4. 60- 79	1		1		0		0	
5. 80-100	30		19		11		26	
No data reported	7		10		12		7	

* The Regional Office auditor should ask the agency for documentation on the extent of updating the RFP inventory and initial in this column if documentation appears adequate.

d. Other Uses of Emission Inventories

Indicate below other uses that were made of your agency's criteria pollutant emission inventories in the past year, not necessarily just in nonattainment areas. (Check "x" where appropriate.)

	PM	SO_2	NO_x	VOC	CO	Pb
1. Used for developing and evaluating area-wide control strategies	25	24	17	27	20	11
2. Used as input to dispersion and other air quality models	39	43	28	18	20	14
3. Used to project possible areas of high pollutant concentrations to help place ambient monitors	21	26	11	6	16	12
4. Used for source permits or inspections, including for assessing permit, operating, and inspection fees	42	41	37	35	35	22
5. Used for responding to information requests	48	49	44	46	40	24

	PM	SO_2	NO_x	VOC	CO	Pb
6. Used indirectly for general program planning	37	34	30	38	31	22

7. Other uses (specify) 13 - a variety of special projects, enforcement/compliance, and toxic evaluations.

e. Quality Assurance
(59 agencies)

Quality (or validity) assurance for emission inventories involves checks of the procedures, emission factors, calculations, etc., that were used during compilation as well as checks for missing sources and edit checks for reasonableness. Specify below the statement that best describes the quality assurance measures that are conducted on your State's emission inventories.

1. 20 Formal, rigorous, regular checks are implemented

2. 36 Less formal, spot checks are made, on an irregular basis

3. 0 No quality assurance measures are implemented

4. 3 No response

f. What should EPA do to help you make your criteria pollutant inventories more comprehensive, accurate, and current? (Check "x" where appropriate.)

	Very Important	Useful	Current Data and Guidance Adequate	No Strong Opinion
1. Provide better guidance on...				
-Point sources	12	12	26	4
-Area sources	20	19	9	6
-Highway vehicle	8	14	18	13
-Locating sources	3	8	26	16
-Questionnaire design	3	7	30	12
-Quality assurance	6	18	20	9
-Data handling	16	6	24	7

	Very Important	Useful	Current Data and Guidance Adequate	No Strong Opinion
-Reflecting SIP regs in projection inventory	4	11	16	23
-Other(specify) 11 - a variety of guidances and emission factors are needed				
2. Improve emission factors in AP-42	33	15	5	2
3. Provide computerized systems having better data handling capabilities	27	10	11	6

4. Other(specify) 16

EPA Regional Office Response (Confirmation or Comment) ______

The composite questionnaire indicated that RFP is tracked for approximately 75 percent of the required areas by 19 of the 28 responsible agencies. Resource constraints and incomplete SIPs appear to be the primary reasons that RFP has not been tracked in the remaining areas. In general, it appears that updated emission estimates for more than half of the VOC sources have been obtained within the last year, 60 percent for regulated minor sources to 75 percent for major point sources of the RFP areas, with the exception of unregulated minor sources, updated for approximately 48 percent of the areas.

The composite form shows that most of the 59 responding agencies use criteria pollutant inventories for a wide variety of purposes. The most frequent uses are related permit and inspection programs, response to information requests, and general program planning. There appears to be some indication that additional guidance, and perhaps resources, should be devoted to an emission inventory quality assurance program, since 60 percent of the agencies characterized their inventory quality assurance as "less formal, spot checks on an irregular basis." However, about a third of the agencies characterized their quality assurance as "formal, rigorous, regular checks." The questionnaire did not define what formal or rigorous meant; therefore, the response to the questionnaire was left to the discretion of the auditor. Additionally, the audited agencies clearly indicated a need for better guidance with respect to area sources and quality assurance, and improved emission factors.

Section B.2. VOC Inventories in O_3 Nonattainment Areas

The questions asked in this section were designed to determine the methods, extent, and basis for VOC emission inventory adjustments. Other aspects of this section were intended to obtain information about the inclusion of recently identified VOC sources, and to determine the use of an EPA per-capita emission factor for miscellaneous solvents. Similar to the inventory uses section, agencies were asked how EPA could help to improve their VOC emission inventories with respect to adjustments, exclusions, and additional or better emission factors.

B.2. VOC Inventories in O_3 Nonattainment Areas
(29 agencies)

Current guidance requires that VOC inventories in O_3 nonattainment areas be adjusted in various ways to reflect reactive emissions occurring during the O_3 season. The following questions address the adjustments made in your agency's VOC inventory and apply to all components of the inventory; i.e., point, area, and highway vehicle sources. (NOTE: if your State contains no nonattainment areas for O_3, check here [30] and go to B.3.)

State/local Agency Response

a. EPA guidance specifies that methane, ethane, methylene chloride, methyl chloroform, trifluoromethane and six chlorofluorocarbons should be excluded from O_3 SIP inventories as nonreactive. Indicate below your agency's exclusion of nonreactive VOC compounds from its O_3 SIP inventory.
(Check "x" where appropriate.)

1. 2 No VOC compounds have been excluded as nonreactive (if checked, go to question b.)

Check the compounds that are excluded from the O_3 SIP as nonreactive.

2. 27 Methane
3. 23 Ethane
4. 21 Methylene chloride
5. 24 Methyl chloroform
6. 21 Trifluoromethane
7. 21 Chlorofluorocarbons CFC-11, CFC-12, CFC-22, CFC-113, CFC-114, CFC-115
8. 3 Others - specify compounds CO, CO_2, benzene, carbonic acid, metal carbides

9. 13 The agency excludes the following compounds based on vapor pressure cutpoints: 10-0.1 mmHg while other conditions .002 lb/in^2, 0.01kPa, 2.0kPa used by some agencies for specific facilities

b. What technical basis does your agency use to identify and quantify nonreactive VOC? (Check "x" where appropriate.)

1. 2 Nonreactive VOC not excluded, so question not applicable
2. 12 Use EPA's VOC Species Data Manual
3. 16 Use MOBILE3 option to generate nonmethane VOC emission factors for highway vehicles
4. 7 Use general species profiles from the literature
5. 11 Sources are asked to list nonreactive compounds in their VOC emissions
6. 6 Other (specify) ______________________________

c. Higher summertime temperatures can have a marked impact on the levels of evaporative VOC from several important source categories. Likewise, lower summertime volatilities of gasolines, as reflected by lower Reid Vapor Pressures (RVP), can also have an impact. Have your VOC totals been adjusted for conditions representative of the O_3 season?

1. 19 Yes 10 No

If yes, check the appropriate statement(s) below:

2. 18 Higher O_3 season temperatures have been considered in generating highway vehicle emission factors
3. 15 Higher O_3 season temperatures have been considered in estimating evaporative losses from petroleum product (including gasoline) storage and handling.
4. 7 Lower summertime RVP's have been considered in estimating evaporative losses from gasoline storage and handling

d. A number of source categories have recently been identified as being potentially significant VOC emitters that have not traditionally been included in VOC inventories, especially those related to fugitive and/or waste treatment processes. Have the following sources been included in your agency's VOC inventory? (Specify "yes" or "no," or "N/A" if no such sources are located in your area.)

	Yes	No	NA	
1.	3	26	0	POTW's (Publicly Owned Treatment Works, i.e., sewage treatment plants)
2.	9	20	0	TSDF's (Treatment, Storage and Disposal Facilities for hazardous wastes, including landfills, surface impoundments, waste piles, storage and treatment tanks, hazardous waste incinerators, and injection wells)
3.	15	8	6	Fugitive leaks from valves, pump seals, flanges, compressors, sampling lines, etc., in organic chemical manufacturing facilities (esp. SOCMI)

e. EPA has recommended an emission factor of 6.3 lb/capitayear to account for miscellaneous commercial/consumer solvent in urban areas. Check below which one response best describes your agency's handling of this source category.

1. 25 EPA per-capita factor used both in base year and projected attainment year inventories

2. 1 EPA factor used in base year but a lower factor used in attainment year inventories, projecting lower commercial/consumer solvent use in future

3. 3 Non-EPA factors used in both base year and attainment year inventories

4. 0 This source category not considered in VOC inventory

f. In question B.1.f, we asked how EPA could help you on your criteria pollutant inventory. Indicate below where your agency specifically feels better information or guidance is needed to improve its VOC inventory. (Check "x" where appropriate.)

	Very Important	Useful	Current Data or Guidance Adequate	No Strong Opinion
1. Excluding nonreactive VOC	4	5	20	0
2. O_3 season adjustment of VOC totals	6	11	10	2

	Very Important	Useful	Current Data or Guidance Adequate	No Strong Opinion
3. Emission factors for sewage treatment plants and hazardous waste treatment, storage, and disposal facilities	13	14	1	2
4. Updated commercial/ consumer solvent factors	13	10	2	4

5. Other (specify) 12 - need additional guidance and new or improved emission factors

The agency responses shown on the composite questionnaire indicate that many agencies (72 to 93 percent) are excluding one or more of the EPA specified nonreactive hydrocarbon compounds from their O_3 nonattainment SIP inventories. This range of percentages covers the percentage exclusion for each of the listed nonreactive pollutants. In general, this exclusion is based on the VOC Species Data Manual, MOBILE3 options, or source listings of nonreactive compounds. Some of this last group, particularly benzene, are not excludable according to EPA guidance.

Responses to questions dealing with the effects of higher summertime temperatures on VOC losses show that 65 percent, or 19 agencies, adjust their inventories to account for these differences. Specifically, 18 agencies consider temperature when generating their highway emission factors. Similarly, 15 agencies adjust values for evaporative loss from storage and handling facilities, and 7 utilize lower summertime RVP Regional Oversight Policies (ROP) to adjust losses from these facilities.

At the time of this audit, the majority of the agencies were not including VOC emissions from newly identified potentially significant VOC sources. Three such potential sources, POTWs, TSDFs, and fugitive leaks from valves, pumps, etc., were addressed in the questionnaire. Only about 30 percent of the inventories included emissions from TSDFs and a little over 50 percent of the inventories addressed fugitive leaks.

The questionnaire response shows that most agencies, 84 percent, are using the EPA recommended per-capita emission factor to account for miscellaneous commercial/consumer solvents in urban areas. In response to the question, "How can EPA help to improve inventories," it appears that most agencies feel that the per-capita solvent factor needs to be updated and that new emission factors need to be developed for POTWs and TSDFs.

Section B.3. CO Emission Inventories

The CO nonattainment area emission inventory section was designed to answer questions concerning geographic coverage of CO inventories. Additional agencies were asked if they included woodstoves in their inventory and if they attempted to locate potential CO hot spots.

B.3. CO Emission Inventories in CO Nonattainment Areas (35 agencies)

If your State contains no CO nonattainment areas, check here [24] and go to B.4.

State/Local Agency Response

a. Indicate which response(s) below describe the geographic coverage and focus of your agency's CO inventory. (Check "x" where appropriate.)

1. 16 Major emphasis is on maintaining a CO inventory for highway vehicle sources for certain traffic areas such as Central Business Districts, intersections, or specific nonattainment areas
2. 24 Areawide or countywide CO inventory is maintained, covering major CO point sources, area sources, and highway vehicles
3. 5 CO inventory is not currently maintained

b. Are woodstoves included in your CO emission inventory?

12 Yes 22 No

c. Is the highway vehicle inventory or transportation/traffic data used to locate potential CO hot spots?

26 Yes 10 No

Thirty-five agencies responded to questions in the CO nonattainment area section. Their responses show that 44 percent of the agencies characterize their geographic inventory coverage as limited to highway vehicle sources in certain limited areas, such as central business districts or specific nonattainment areas. Approximately 65 percent of the agencies indicated a much broader inventory coverage as areawide, including major sources, area sources, and highway vehicles. Seven agencies, or 19 percent, indicated both of the above, and 5 agencies said they did not currently maintain a CO emission inventory.

With respect to their CO inventories, 63 percent of the agencies do not include woodstoves. However, 72 percent of the agencies are using their highway inventory or transportation/traffic data to locate potential CO hot spots.

Section B.4. Highway Vehicle Inventories in O_3 and CO Nonattainment Areas

The 1985 audit of emission inventories indicated that a substantial number of air pollution control agencies compile their highway vehicle inventories cooperatively with a planning agency or a transportation department. In these cases, the planning agency or transportation department is the lead agency. This section was designed to develop a better understanding of who compiles the highway emission inventories and what factors are involved.

B.4. Highway Vehicle Inventories in O_3 and CO Nonattainment Areas (45 agencies)

Highway vehicle emissions are often compiled by the air pollution control agency acting in concert with the local planning agency or transportation department. In some instances, the local Metropolitan Planning Organization (MPO) or Department of Transportation (DOT) will compile the inventory independently as the lead responsible agency. In general, highway vehicle emissions are calculated by applying mobile source emission factors to transportation data such as vehicle miles traveled (VMT), trip ends, etc. Mobile source emission factors are available for various vehicle types and conditions from an EPA emission factor model entitled MOBILE3 (or from earlier versions). Important conditions affecting emissions are vehicle age and mix, speed, temperature, and cold start operation.

If your State contains no O_3 or CO nonattainment areas, check here [15] and go to B.5.

State/local Agency Response

The State or local agency should answer the following questions even if a transportation or planning agency is responsible for the highway vehicle inventory.

a. Which agency maintains the highway vehicle emission inventory for the O_3 and/or CO nonattainment areas? (Check "x" where appropriate.)

1. 21 Air pollution agency (State or local)
2. 20 Local planning organization (MPO, COG, RPC, etc.)
3. 11 State or local transportation department (DOT)
4. 1 Other (specify ____________________
5. 1 None is maintained

6. 1 Unsure

b. If an agency other than the air agency maintains the highway vehicle inventory, indicate what difficulties (if any) result. (Check "x" where appropriate.)

1. 21 No significant difficulties are evident
2. 2 Scheduling and coordination of activities are negatively affected
3. 1 The air agency loses control of the design and format of the inventory
4. 3 The responsible agency has not been adequately funded to be responsive
5. 4 Additional technical guidance is needed for effective communication of program needs to another agency
6. 2 Other (specify) cold starts, local does not receive results of update.

c. Conversely, indicate what benefits (if any) accrue from having another agency responsible for the highway vehicle inventory. (Check "x" where appropriate.)

1. 4 No significant benefits result
2. 25 Less resource drain on the air agency
3. 21 The air agency doesn't have to develop transportation planning expertise
4. 9 A better product results
5. 3 Other (specify) to better working relationships leading to more influence in transportation network design, use of computer system

d. Which emission factor model (MOBILE 1, 2, 2.5, or 3) was used to generate the highway vehicle emission factors for the most recently developed or maintained inventory? Mobile 1-0, 2-5, 2.5-3, 3-31, U-6

(Indicate number or "U" if unsure.)

e. Were the highway vehicle emission factors in the model tailored to your area to account for the following parameters? (Indicate "Yes," "No" or if unsure, specify "U.")

			Yes	No	Unsure
1.	____	Vehicle mix	29	11	5
2.	____	Vehicle age	26	12	7
3.	____	Speed	39	3	3
4.	____	Ozone season temperature	26	12	7
5.	____	Cold/hot start operating modes	24	12	9

f. Were data from the local transportation planning process used to compile the most recently developed or maintained highway vehicle inventory? (e.g., VMT, street locations, traffic volumes, growth patterns, etc.)

Yes 34 No 4 Unsure 7

g. If not, were gross areawide estimates of VMT or gasoline sales used to compute emissions?

Yes 6 No 5 Unsure 6

h. An important component of travel sometimes overlooked in highway vehicle inventories is VMT associated with minor roads and connectors, often called "local" or "off network" travel. Was local travel included in your most recently-developed or maintained highway vehicle inventory?

Yes 27 No 5 Unsure 13

i. The results of last year's audit indicated that significantly fewer highway vehicle inventories contained NO_x emissions than VOC emissions. Indicate if and why this is so for your agency. (Check "x" where appropriate.)

1. 28 Not so. Our highway vehicle inventory contains both NO_x and VOC.

2. 6 NO_x inventory not perceived as needed because NO_x reductions are not required for O_3 control

3. 2 NO_x inventory perceived as needed for O_3 but it was not included because of resource limitations

4. 3 Other (specify) ______________________________

5. 6 No response

j. Last year's audit asked each agency to specify the base year of the highway vehicle inventory in the SIP, which gave a limited idea of how well these inventories have been maintained to the present. What is the latest year of record for which your agency's highway vehicle inventory has been updated? When was this done?

Latest year of record		Latest year update was performed		No. of years from last up through 1987	
1977	2	1982	6	0	1
1979	1	1983	1	1	11
1980	4	1984	6	2	15
1982	6	1985	15	3	6
1983	7	1986	11	4	3
1984	9	1987	1	5	6
1985	8				
1986	3				
1987	1				
No response	4	No response	5		

An analysis of the responses on who compiles and maintains the highway emission inventory indicates that about 47 percent of the inventories are principally an air pollution agency function and the remaining inventories, 53 percent, are maintained by some other agency, usually a local planning agency or State/local transportation department. Comments from the air pollution agencies with highway vehicle emission inventories maintained by another agency indicate that 85 percent of them have no significant difficulties with this arrangement. Those who do have problems with this arrangement cite scheduling, loss of control, adequacy of funding (other agency), and need for technical guidance as significant problems. Nearly all of the audited agencies maintaining the inventory indicated as the principal benefit not having to develop transportation planning expertise. Almost 25 percent of the agencies believed a better inventory was produced in cooperative efforts than the air agency alone would have been able to produce.

Each agency was asked which emission factor model was used to generate the highway emission factors for its inventory. Five agencies are using MOBILE2, three are using MOBILE2.5, and 31 are using MOBILE3. Additionally, six agencies are unsure about which version is being used. In addition to information about which version was used, each agency was asked to give the various user defined parameters they employed, as opposed to model default values. The variables are vehicle mix, vehicle age, speed, ozone season temperature, and cold/hot starts. The agencies' use of these parameters to tailor the model to individual areas ranged from 53 to 86 percent. The most frequently involved variable was speed, with cold/hot start information being least frequently applied. Thirty-four agencies, 75 percent, indicated that data from the local transportation planning process were used to generate their most recent emission inventory. Six agencies said that gross areawide estimates of either vehicle miles traveled (VMT) or gasoline sales were used to compute emissions. An important component of highway vehicle inventories is the VMT associated with "local" or "off network" travel. Twenty-seven agencies included "off network" travel in their inventory, and 18 agencies either did not use it or were unsure if this component was included.

The 1985 audit found that many highway inventories did not include NO_x emissions. Analysis of the audit questionnaire shows that 62 percent of the agency inventories include both VOC and NO_x emissions. Eight agencies do not include NO_x in their inventories, because they do not perceive a need to reduce NO_x as a means of reducing O_3 or because of resource problems. The remaining nine agencies either did not respond to this issue or stated they had problems only with CO.

The last question in this section requested the latest year of record used in the highway vehicle inventory, and the year in which the inventory was most recently updated. The years of record ranged from 1977 to 1987, while the most recent updates were performed between 1982 and 1987. Through the end of 1987, 27 agencies (60 percent) had updated their traffic data within the previous 2 years.

3.4 MODELING

Introduction

In the National Air Audit, the State and local agencies were queried concerning the following aspects of dispersion modeling:

- Experience and training of agency personnel conducting modeling
- Availability of various guideline, other EPA recommended, non-guideline, screening, and other models
- Uses of non-EPA recommended modeling techniques
- EPA Regional Office review and revision of modeling applications conducted by the State and local agencies.

The purpose of these questions was to discover any widespread problems that State and local agencies may be having in conducting dispersion modeling analyses that they are required to perform.

In this section, the results of the questionnaire on dispersion modeling are presented. Major findings and conclusions that arose from the results of the audit are presented. Then, further detail is provided on the responses to individual questions with summary statistics.

Major Findings and Conclusions

Although the purpose of the audit's questions on modeling was to determine the adequacy of the State and local agencies' modeling staff to perform or review modeling analyses in support of the agencies' SIP or permitting activities, the responses can only measure the general adequacy of the agencies' staffs. The adequacy of a particular modeling analysis is dependent upon such factors as the purpose of the analysis, complexity and availability of suitable models, level of detail required by the model chosen, and availability of meterological data, source data, topographic and other data. The responses to the audit's questions can be useful in identifying potential problems in the agencies' abilities to conduct routine analyses.

Overall, the responses indicate that agency modeling personnel have the educational background to be able to conduct modeling. If experience is taken into account, even those who do not have a degree in meteorology, engineering, or science, or do not have formal training in modeling, do have experience in modeling. As a result of this combination of education, training, and experience, the State and local agencies' staffs appear to be capable of performing modeling analyses.

The State and local agencies have access to a wide variety of dispersion models. However, it appears that many may be using outdated versions of UNAMAP. Since the major change in UNAMAP occurred in July 1986, those agencies audited in FY 1986 could not have been using this new version and the decision was made not to change the question for FY 1987. This apparent failure to update their models may be an artifact of the same question being asked in two fiscal years. It should also be noted that the Guideline on Air Quality Models was significantly revised near the midpoint of the biennial audit (September 1986). Several models were added to the Guideline and a few were deleted. Again, the questions regarding use of guideline and non-guideline models were not changed in midstream.

The responses of the agencies indicate that they are most comfortable with models that predict concentrations of particulate matter, sulfur dioxide, and other non-reactive pollutants from sources located in simple terrain. They tend to have less access to and familiarity with models used to determine impacts from mobile sources. Access to and familiarity with ozone models such as EKMA and the Urban Airshed Model is even less common. Since these models will be the primary ones used in analyses for the post-1987 ozone SIPs, the lack of access to and familiarity with these models may pose a problem for some agencies.

State and local agencies reported the use of non-guideline modeling techniques in only about 10 percent of their modeling analyses. The most common reason for using a non-guideline technique was the presumed technical superiority of the non-guideline method over that recommended in the Guideline. There was no indication as to the performance evaluation used to justify the use of a non-guideline technique. These instances may be indicative of the agencies using unapproved techniques in situations such as complex terrain for which the recommended models may not be refined. In addition, there were 321 instances where the Guideline recommendations on the use of data bases were not followed. The vast majority of these were cases in which 5 years of off-site or 1 year of on-site meteorological data were not used. These instances may be due to model applications in areas for which there were little or no meteorological data.

There were few cases in which the EPA Regional Offices reviewed the State or local agencies' analyses and required a revised analysis. It is unclear whether the small number of reviews and revisions was due to the expertise of the agencies or to the fact that few analyses were submitted to the Regional Offices for review.

Responses to Individual Questions

Experience and Training

In order for a State or local agency to have the ability to conduct modeling analyses adequately, it should have an experienced staff of modelers who have some educational background in modeling. Table 3.5 summarizes the responses to these questions. The agencies reported a total of 346 personnel that are involved in modeling. The majority of these, i.e., 203 or 58 percent, are engineers or scientists. Another 77, or 22 percent, are meteorologists. Only 66, or 19 percent, were listed in the "other" category.

These categories were further subdivided into those with and without training in modeling. Of the engineers and scientists, 119 or 34 percent of all personnel involved in modeling have training in dispersion modeling. Of the "others", only six, or 2 percent, of the total personnel involved in modeling have training. A total of 60 personnel, or 17 percent, of the total do not have a degree in meteorology, engineering, or related science, and do not have training in modeling.

The second aspect of this question was the number of years of experience in modeling that State and local agency personnel have. Three-fourths of the modeling personnel have over 2 years of experience in modeling. The breakdown by range of years of experience was: 25 percent with 0 to 2 years of experience, 14 percent with from 2 to 5 years, 26 percent with from 5 to 10 years, and 34 percent with over 10 years of experience.

Since the real picture of the experience and training of State and local agency modeling personnel is a combination of the two, a further analysis of the two categories of expertise is of interest. Of all the modeling personnel reported, only 12, or 3 percent, were categorized as having less than 2 years of experience and not having a degree in meteorology, engineering, or a science, or training in modeling. All of these personnel work at agencies where they are supervised by more experienced modelers. Thus, it appears that the modeling personnel at the State and local agencies do have sufficient education, training, or experience to conduct modeling analyses.

TABLE 3.5

SUMMARY OF EXPERIENCE AND TRAINING OF MODELING STAFF

Professional Qualifications	Experience in Years 0-2 (%)	2-5 (%)	5-10 (%)	>10 (%)	Total (%)	Total Number
Meteorologist	3	3	9	7	22	77
Engineer/Scientist with Modeling Training	11	6	10	7	34	119
Engineer/Scientist without Modeling Training	6	2	5	11	24	84
Other with Modeling Training	1	0	0	0	2	6
Other without Modeling Training	3	3	2	9	17	60
Percentage with Years of Experience	25	14	26	34	100	
Total Number of Staff with Years of Experience	87	49	91	119		346

Note: The percentages may not add up to 100 percent because of rounding.

Model Availability

Three questions were asked to determine the availability and existence of in-house expertise in a wide range of models, the type of access to models available to the State and local agencies, and the capability to modify model software. In conjunction with the previous questions concerning experience and training, these questions are important in evaluating the capability of the agencies to conduct modeling analyses. If they do not have access to and in-house expertise in the use of a variety of models, no amount of education and training will be sufficient to provide the capability to conduct extraordinary analyses. Responses to individual questions on model availability are summarized in Table 3.6.

The agencies were first asked to identify the Version Number of UNAMAP that they are currently using. Although the current version of UNAMAP is No. 6, the question did not include that version as an option since that version became available in July 1986 and the question was not revised between FY 1986 and FY 1987. Thus, although 26 agencies or 43 percent of the respondents indicated that they are using Version 4, this may have been a response in FY 1986, and Version 6 may be the one that these agencies now use. Similarly, of the respondents, 35 percent or 21 agencies are using Version 5 of UNAMAP. Other versions of the models are being used by 18 perent of the respondents, or 11 agencies. It is unknown whether any of these began using the current Version 6 by the end of FY 1987. The remaining respondents (3 percent or 2 agencies) indicated that they did not know which version they are using.

A second part of the question addressed the availability of and in-house expertise in the use of specific models. This part of the question was divided into four subparts based upon the following classification of models:

- EPA guideline models including APRAC-1A, AQDM, CDM, RAM, CRSTER, TCM, TEM, and HIWAY
- Other EPA recommended models such as ISCLT, ISCST, MPTER, and CDMQC
- Other models such as EKMA, the Urban Airshed Model, PAL, PLUVUE, and others
- Screening techniques including PTMAX, PTDIS, PTMTP, PTPLU, VALLEY, COMPLEX I, and others

This division of models is logical from the standpoint of the discussion of models in the Guideline on Air Quality Models (1978) then in effect. The Guideline on Air Quality Models (Revised) was promulgated in September 1986. The ISCST, ISCLT, CDMQC, MPTER, and Urban Airshed Model became EPA guideline models, while the APRAC-1A, AQDM, TCM, and TEM were deleted. While the Guideline was undergoing revision, other refined models, including these latter four models, were recommended for use in the Regional Workshops on Air Quality Modeling, A Summary Report (1983).

TABLE 3.6

SUMMARY OF MODEL AVAILABILITY

Item	Positive Response (%)
UNAMAP Version Number:	
Version No. 5	35
Version No. 4	43
Other	18
Don't Know	3
Access to EPA Guideline Models:	
APRAC-1A	74
AQDM	78
CDM	90
RAM	91
CRSTER	94
TCM	74
TEM	77
HIWAY	89
In-House Expertise in the Use of EPA Guideline Models*:	
APRAC-1A	37
AQDM	55
CDM	78
RAM	79
CRSTER	90
TCM	53
TEM	51
HIWAY	63
Access to Other EPA Recommended Models*:	
ISCLT	96
ISCST	92
MPTER	96
CDMQC	91
In-House Expertise in the Use of Other EPA Recommended Models*:	
ISCLT	82
ISCST	94
MPTER	82
CDMQC	79
Access to Other Models*:	
EKMA	77
AIRSHED	40
PAL	89
PLUVUE	50

TABLE 3.6 -- Concluded

Item	Positive Response (%)
In-House Expertise in the Use of Other Models*:	
EKMA	55
AIRSHED	30
PAL	70
PLUVUE	38
Access to Screening Techniques:	
PTMAX	96
PTDIS	88
PTMTP	85
PTPLU	98
VALLEY	92
COMPLEX I	83
In-House Expertise in the Use of Screening Techniques:	
PTMAX	91
PTDIS	87
PTMTP	87
PTPLU	90
VALLEY	90
COMPLEX I	72
Model Access Obtained by:	
Telephone line to State/local agency mainframe computer	34
Telephone line to private or subscription computer	4
In-house dedicated computer	49
Telephone line to EPA computer	13
Ability of staff to modify software for models	81

* Note that the Guideline on Air Quality Models was revised in September 1986, and the regulatory status of several models changed as indicated in the text.

The percentages given in Table 3.6 for each model are based upon the number of responses for that specific model. In general, agencies have access to and expertise in the use of traditional Gaussian models used to predict concentrations resulting from emissions of sulfur dioxide and particulate matter from stationary sources. The highest number of positive responses in terms of the number and percentage of agencies responding that they have access and in-house expertise were for the PTPLU, PTMAX, ISCLT, MPTER, CRSTER, VALLEY, ISCST, CDMQC, RAM, and CDM models. (Over 90 percent of the agencies that responded to the question concerning these particular models indicated that they had access to them. A high percentage, i.e., generally greater than 80 percent, indicated that they have in-house expertise in these models.)

The positive response rate for other models was less. The lowest rate was for the Urban Airshed Model. Only 40 percent of the agencies responding, or 16 agencies, indicated that they had access to that model. Only 11 agencies indicated that they had in-house expertise in the use of the Urban Airshed Model. PLUVUE was the next least likely model to which the agencies have access and with which the agencies have in-house expertise in its use.

The lack of access to and in-house expertise in the use of these two models is not surprising. The Urban Airshed Model is a complex numerical model for analyzing ozone. The amount of data and resources, i.e., computer time and manpower, needed to run it are intensive. As a result, many agencies have used EKMA in the past to analyze ozone nonattainment problems. The access to and in-house expertise in the use of EKMA is more widespread. Of the agencies responding to this portion of the question, 77 percent or 34 agencies have access to EKMA, and 23 agencies or 55 percent of the respondents have in-house expertise in the use of EKMA. Due to the emphasis that will be placed upon ozone nonattainment problems in the future, increased access to and in-house expertise in the use of the Urban Airshed Model and EKMA may be necessary. PLUVUE is a complex model used to analyze source impacts on visibility. It is unlikely that there are many agencies that have had to conduct such visibility analyses.

Most State and local agencies have access to the models through the use of in-house dedicated computers. The questionnaire did not ask whether these in-house computers were mainframes, minicomputers, or personal computers (PCs). However, PCs have become popular with State and local agencies, and many of the Gaussian models for predicting concentrations of particulate matter and sulfur dioxide are available for PCs. The next highest percentage of agencies, i.e., 34 percent, have access via a telephone line to a State or local agency mainframe computer. Seven of the agencies, or 13 percent, use a telephone line to EPA's computer. Only two agencies, or 4 percent, use a telephone line to a private or subscription computer.

The last part of this question concerned the ability of the State and local agencies to modify model software. Of the respondents to this part of the question, 81 percent indicated that they had that capability. A total of 38 agencies reported that they had modified model software.

Alternate Modeling Techniques

The third question in the questionnaire for modeling dealt with the use of non-guideline methods and models. Responses to this question are summarized in Table 3.7. The responses from State and local agencies indicated that in 256, or 10 percent, of the total of 2,499 modeling analyses performed, the agencies had used techniques that are not recommended by EPA. Over half, i.e., 56 percent, of these involved the use of a non-guideline model. Of course, this number could include models such as ISCST and ISCLT, because the Guideline was revised during the period of the survey. The next highest percentage of cases (16 percent) was reported because a guideline model had been modified.

Although the agencies were asked to provide a reason for using a non-approved modeling technique, few responded. Of those that responded, the most common reason provided was that the alternative technique was judged to be technically superior to the recommended one.

The agencies also reported 321 instances when EPA guidance on data bases to be used for modeling was not followed. Of these instances, 93 percent or 309 entailed a failure to use 5 years of off-site meteorological data or 1 year of on-site data. There were few instances of the use of other types of non-approved databases.

Regional Office Review and Revision of Modeling Analyses

In the fourth set of questions which are summarized in Table 3.8, the Regional Offices and the State and local agencies were asked to identify the number of modeling analyses that had been submitted to the Regional Offices for review and the number that required revision because they were technically inadequate or deviated from EPA guidance. The numbers reported by the Regional Offices and the State and local agencies were identical. A total of 18 analyses were submitted for review. Of these, 10 were conducted for new source review, 5 for SIP modeling, and 3 for "bubble" policy applications. Four of the new source review analyses had to be revised, and one each of the other types of analyses had to be revised. Reasons provided for requiring that the analyses be revised included the following:

- Complex terrain considerations (3)
- Use of non-guideline model without a performance evaluation (2)
- Receptor network design (2)
- Emission inventory and operating parameters (1)
- Meteorological data (1)
- Comparison with acceptable air quality levels (1)

The number of reasons given exceeds the number of revisions required because a revision may have been required for several different reasons.

TABLE 3.7

SUMMARY OF ALTERNATE MODELING TECHNIQUES

Item	Percentage of Cases (%)
Analyses Using Non-EPA Recommended Techniques*	10
Types of Non-EPA Recommended Techniques:	
Use of a non-guideline model*	56
Modification of a Guideline model	16
Use of a non-recommended option in a Guideline model	4
Use of a Guideline model outside its stated limitation	11
Other	13
Selection/Use of Database for Models That Does Not Conform to EPA Guidance:	
Other than 5 yrs of off-site or 1 yr of on-site meteorological data	93
Techniques other than those from the Guideline on Air Quality Models	5
Techniques other than those in EPA policy on calms	0
Techniques other than those in EPA policy on design of receptor network	2

* Note that the Guideline on Air Quality Models was revised in September 1986, and the regulatory status of several models changed as indicated in the text.

TABLE 3.8

SUMMARY OF EPA REVIEWS OF MODELING ANALYSES

Item	Number
State and Local Agency Modeling Analyses Reviewed by EPA Regional Offices, by Type of Regulatory Program:	
Bubble	3
Section 107 redesignations	0
New source review	10
Nonattainment area SIP analyses	0
Lead SIPs	0
Other SIP modeling	5
Total	18
State and Local Agency Modeling Analyses Reviewed by EPA Regional Offices That Had to be Revised, by Type of Regulatory Program:	
Bubble	1
Section 107 redesignations	0
New source review	4
Nonattainment area SIP analyses	0
Lead SIPs	0
Other SIP modeling	1
Total	6
Reasons for Revision of Modeling Analyses:	
Use of an inappropriate guideline model	0
Use of non-guideline model without a performance evaluation	2
Urban/rural dispersion coefficients	0
Emission inventory and operating design parameters	1
Meteorological data	1
Receptor network design	2
Complex terrain considerations	3
Downwash considerations	0
Comparison with acceptable air quality levels	1
Technical documentation	0
Other	0

The responses to this question do not suggest that there is a major problem in the application of guideline methods or models. The fact that only 18 analyses were referred to the Regional Offices indicates that the vast majority of analyses were routine and non-controversial. Since the analyses that were submitted were ones that entailed non-routine or controversial model applications, it is understandable that one-third of those reviewed would have to be revised.

3.5 SIP EVALUATION AND IMPLEMENTATION

Introduction

An evaluation of SIP development and implementation activities was designed to assess whether State plans for attainment are being reasonably carried out. The evaluation was also designed to identify needs of State and local agencies in developing and updating SIPs. This section of the report summarizes major findings in these areas and presents detailed information in each of the audit areas. Audit questions covered by the SIP Evaluation and Implementation section of the Air Quality Planning and SIP Activity audit include:

- Timeliness of Regulatory Development
- Timeliness of Studies
- Transportation Control Measures
- Source Activity
- Generic Bubble Rules.

Major Findings and Conclusions

Timeliness of Regulatory Development

The SIP evaluation and implementation audit identified that 29 percent of the revisions and strategies related to SIPs or Section 111(d) plans had not been completed and, of those completed, 24 percent were not on schedule. The audit found three major causes for these SIP submittal delays: the schedule was overly optimistic, insufficient resources, or other reasons specific to each revision.

Timeliness of Studies

The audit also revealed that 24 percent of additional studies (such as nontraditional TSP or CO hot spots) had not been completed, and that 56 percent of these were behind schedule. Reasons cited for delays included an overly optimistic schedule, a change in guidance or scope of work from the original plan, the schedule was contingent on another action that did not occur, insufficient resources, and unclear or unassigned responsibilities.

Transportation Control Measures

It was found that for the transportation control measures (TCMs) that agencies had instituted to control VOC and CO, the implementation rate was 74 percent for traffic flow improvement, 55 percent for mass transit, 80 percent for carpooling, 89 percent for vehicle inspection/maintenance programs, and 68 percent for other measures such as bicycle lanes and parking control.

Source Activity

The audit revealed differences in the values assumed for SIP revisions and the actual growth that occurred. The absolute differences were 1 percent per year for population growth (in 22 metropolitan areas), 1.8 percent per year for employment projections, 1.8 percent per year for vehicle miles travelled, and 1.4 percent per year for major source emissions. Many respondents contemplated a form of action after finding significant differences between their projections and the actual growth figures, including revisions to upcoming reasonable further progress (RFP) reports or to the SIP itself.

Generic Bubble Rules

Based upon data from this audit, only 18 percent of the States have bubble rules formally approved by EPA. The source emissions in these States experienced an overall drop to rates at or below allowable emission standards after the bubbles were implemented. Of the States with bubble rules not formally approved, the source emission rates increased, but 67 percent were at rates at or below the allowable emission standards once the bubbles were implemented. However, through their failure to obtain EPA approval, these States are placing the "impacted" sources in jeopardy of potential EPA action to enforce the original SIP limits.

Responses to Individual Questions

Timeliness of Regulatory Development

One of the purposes of the audit was to determine the effectiveness with which State and local agencies are revising and adopting SIPs and Section 111(d) plans. Questions asked were intended to identify whether strategies related to SIPs or Section 111(d) plans were being developed on time and, if not, to determine the necessity for corrective action. The EPA Regional Offices provided to each agency a list of SIP revisions or strategies, which included Part D plans and non-Part D plans. The Regions requested that States complete a table showing whether action had been completed and submitted, completed and not submitted, not completed but on schedule for completion, or not completed and not on schedule for completion. Table 3.9 presents a summary of responses to the Regional requests. Of a total of 256 revisions or strategies listed, State and local agencies responded to approximately 90 percent. Overall, 152 of 256 revisions or strategies had been completed (59 percent), while 74 had not been completed (29 percent). Of those completed, 115 of 152 (76 percent) were on schedule, while 37 (24 percent) were not on schedule. Of those not completed, 30 of 74 (40 percent) were on schedule, while 44 of 74 (60 percent) were not on schedule.

The audit then asked if agencies experienced any delays in the submission of revisions or strategies, and the causes of such delays. A list of potential causes provided to the agencies is given below:

TABLE 3.9

TIMELINESS OF REGULATORY DEVELOPMENT

Type of Revision or Strategy	Number of Cases	Completed		Not Completed		No Response
		Submitted	Not Submitted	Submitted	Not Submitted	
Part D Plans	155	64	30	20	25	16
Non-Part D Plans	101	51	7	10	19	14
Total	256	115	37	30	44	30

Code	Reason for Delay
A	Unclear or unassigned responsibilities
B	No formal tracking system
C	Schedule was overly optimistic
D	Change in guidance or scope of work from original plan
E	Executive or legislative oversight
F	Insufficient resources
G	Schedule contingent on other action that did not occur
H	Other

Table 3.10 resents a summary of responses to this question, by EPA Region. The reason for delay cited most frequently was an overly optimistic schedule. This was followed by: insufficient resources, other reasons (specific to that revision), and a change in guidance or scope of work. Figure 3.1 graphically shows the percentage of respondents citing each cause for delay of submission.

Timeliness of Studies

EPA Regional Offices provided to State and local agencies a list of additional studies, such as nontraditional TSP or CO hot-spot modeling studies, that had been approved as part of SIP control strategies. As in "Timeliness of Regulatory Development," agencies were requested to complete a table showing whether action had been completed and submitted, completed and not submitted, not completed but on schedule, or not completed and not on schedule. Of the 68 cases listed by the Regional Offices, 32 had been completed (47 percent), 16 had not been completed (24 percent), and responses were incomplete for 15 cases (22 percent). Five cases (7 percent) had been cancelled or were ongoing. Of those cases completed, 5 (16 percent) had not been submitted to EPA. Of those not completed, 9 cases (56 percent) were behind schedule.

Fourteen agencies responded with reasons for study delays. Since this question was not mutually exclusive, many States listed more than one reason for a delay. The agencies listed 36 causes of delay for 31 studies.

The following causes were cited by the agencies that responded:

• Schedule was overly optimistic	11 responses (30 percent)
• Change in guidance or scope of work from original plan	9 responses (25 percent)
• Schedule contingent on other action that did not occur	8 responses (22 percent)
• Insufficient resources	5 responses (14 percent)
• Unclear or unassigned responsibilities	1 response (3 percent)
• Other	2 responses (6 percent)

TABLE 3.10

REASONS FOR DELAYS IN THE SUBMITTAL OF SIP REVISIONS AND STRATEGIES

	Percentage of Respondents							
	Cause of Delay[b]							
EPA Region[a]	A	B	C	D	E	F	G	H
I	0	2	9	2	0	5	0	1
II	0	0	0	1	1	0	0	0
III	2	1	2	2	1	0	1	1
IV	2	0	4	7	0	5	2	3
V	0	1	6	4	0	11	1	12
VI	0	0	0	0	0	1	0	0
VII	0	0	0	0	0	0	1	0
VIII	0	0	5	1	0	3	3	4
Total	4	4	26	17	2	25	8	21

[a] No responses were received from Region IX.

[b] The cause of delay code is explained on page 3-42.

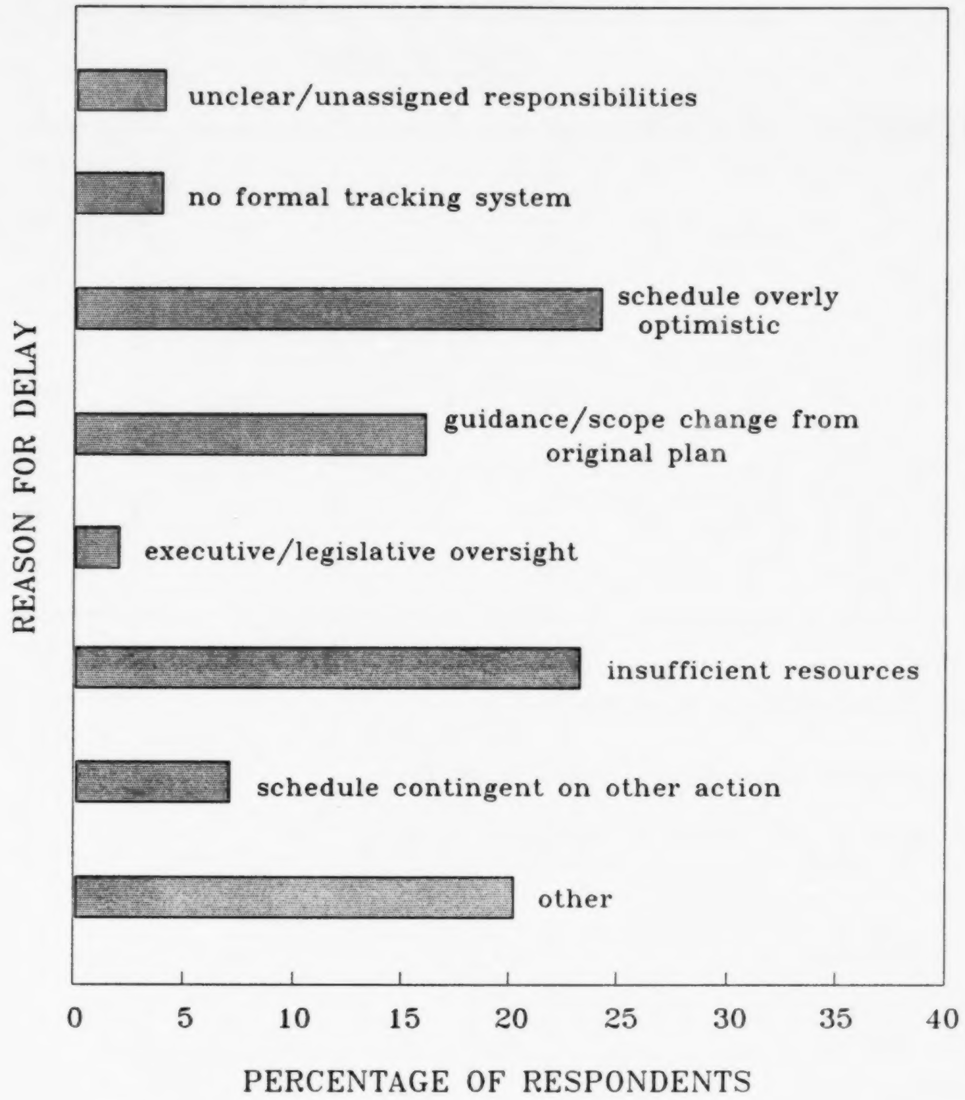

FIGURE 3.1 REASONS FOR DELAYS IN SIP RESPONSES

Transportation Control Measures

This part of the questionnaire was intended to determine the degree to which transportation control measures (TCMs) to control VOC and CO were being implemented. State and local agency officials were asked to list three or more principal TCM categories after consultation with the Regional Office, and give the VOC and CO emission reduction credits assumed for each one in the SIP. Most of the TCMs listed (94 percent) can be categorized under traffic flow improvements (41 percent), mass transit (26 percent), carpooling (20 percent), and vehicle inspection/maintenance (7 percent). The remaining TCMs involved primarily alternate transportation (such as bicycle lanes) and parking restrictions. Emission reductions of VOC and/or CO were provided for 49 percent of the 166 specific TCMs listed.

Agency officials were then asked to name the agency responsible for implementing each measure, the extent to which the measure had been fully implemented, and the basis for determining the extent of implementation. The average percent of implementation reported by the agencies was 74 percent for traffic flow improvements, 55 percent for mass transit, 80 percent for carpooling, 89 percent for vehicle inspection/maintenance, and 68 percent for the remaining measures. Responsible agencies included primarily State and local agencies such as transportation, highway, and motor vehicle departments, and various planning commissions. Estimates of implementation were derived from RFP reports, annual reports, construction schedules, bus utilization and purchase records, and agency estimates.

Source Activity

This section of the questionnaire was concerned with projections of the growth of source activity that agencies make as a part of their SIP development. The questions were to determine (a) if verification checks on these projections are made, (b) the accuracy of the projections, and (c) whether any action is contemplated to account for significant differences. Four projection categories considered indicators of emissions were included: population, employment, vehicle miles traveled, and major stationary source emissions (for cases where a composite growth rate was assumed in the SIP). Responses were requested for each metropolitan area that received an attainment date extension to 1987 or for which EPA called for a SIP revision for CO or ozone.

State and local agencies were first asked to list the growth projections assumed in the latest SIP revision, the actual growth that has occurred, and the difference between these values. Projections of population growth ranged from 0.5 percent per year lower, to 3.4 percent higher, than the actual changes (data for 22 metropolitan areas). The average absolute difference (disregarding the sign of the differences) was 1.0 percent per year. Employment projections ranged from 3.9 percent lower, to 3.7 percent higher, than reality (13 data values). The average absolute difference was 1.8 percent per year. The greatest discrepancies occurred in projections of vehicle miles traveled, which ranged from 10.4 percent lower, to 6.7 percent higher, than true growth figures (18 values). For major source emissions, projections ranged from 5.8 percent lower, to 2.8 percent higher, than the actual figures (11 values). The average absolute difference was 1.4 percent.

Agencies were next asked how recently these projections had been reevaluated using more current information, whether significant differences were found, and what action was contemplated. Table 3.11 summarizes the responses made to these questions. Most projections (over 80 percent) had been reevaluated within the 1 to 2 year period prior to the audit. In performing these reevaluations, agencies found significant differences from the projections made in the latest SIP revision nearly 50 percent of the time.

Many respondents contemplated some form of action as a result of finding significant differences between their projections and actual growth figures. Several of them said that the figures would be revised in their upcoming RFP reports, while about the same number said that the SIP would be revised. A number said that no action was contemplated, with some of these providing the reason that no action was necessary because air quality was not impacted by the projection errors.

Generic Bubble Rules

State and local agencies were asked in the audit questionnaire if they had a generic emission trading (bubble) rule, and the number of bubbles submitted to the EPA Regional Offices in FY 1987. If they did have a bubble rule, a second questionnaire was filled out by the audit team for each source involved.

Twenty States indicated in the questionnaire that they have generic bubble rules. Of the 20, only 9 have generic rules that have been formally approved by EPA. To have operable programs, the remaining States should either have these overall rules approved by EPA rulemaking or submit individual bubble actions to EPA as SIP revisions. If States do not, the source may be subject to EPA enforcement action (because the source is not in compliance with the EPA-approved SIP).

Bubbles Issued Under EPA-Approved Generic Rules

State and local agencies were asked in the questionnaire to indicate the total number of bubbles ever issued under their generic rules. Six of the agencies with EPA-approved generic rules stated that a total of 35 individual bubbles have been issued.

The audit results of the sources revealed that before the bubble, 70 percent of emissions exceeded the allowable emission standard. Once these bubbles were issued, an overall drop in source emissions occurred to rates less than or equal to allowable emission standards. However, no banked emissions resulted from the bubble rules for any source, half of the PSD baseline dates had been triggered, and 27 percent of net baselines increased.

The audit questionnaire revealed the failure of State and local agencies in documenting or in communicating with EPA on the following points:

- Generic rule procedures followed - 18 percent
- Bubble emission limits interfered with attainment and maintenance of NAAQS - 8 percent

TABLE 3.11

AGENCY REEVALUATIONS OF GROWTH PROJECTIONS

	Years Since Last Reevaluation						Significant Differences Found	
Category	No. of Responses	0	1	2	3	4	No. of Responses	Percent Yes Responses
Population	21	10%	43%	24%	14%	9%	28	57%
Employment	13	--	38%	54%	--	8%	17	41%
Vehicle Miles Traveled	19	11%	68%	16%	--	5%	25	48%
Source Emissions	14	7%	57%	29%	--	7%	14	43%

- EPA modeling guidance in approving the bubble - 20 percent
- Bubble subjected to EPA's notice and comment procedures before approval - 50 percent
- Bubble application copies sent to EPA - all
- Permit copy sent to EPA - 67 percent.

Bubbles Issued Under Generic Rules Not Approved by EPA

Twenty-two bubbles were approved by States under generic rules that were not approved by EPA. All of the bubbles have been submitted to EPA for formal approval, but had not received this approval at the time of the audit.

The audit results for these bubbles revealed that before the bubble rule, all of the source emissions met the allowable emission standards. After the bubble rule was in place, increases in actual emission rates occurred, but 67 percent of the sources' emissions were less than or equal to the allowable emission rate. However, the bubbles did not result in banked emissions and all of the PSD baseline dates had been triggered.

The audit questionnaire also showed that State and local agencies had not documented or communicated with EPA on the following points:

- Generic rule procedures followed - all
- New emission limits violate PSD increments - all.

CHAPTER 4

NEW SOURCE REVIEW

4.1 EXECUTIVE SUMMARY

For the FY 1986-87 audit cycle, EPA retained the same NSR audit procedure as the one followed in 1985. This procedure involved the examination of State and local agency permit files for all kinds of stationary sources. EPA auditors were instructed to review both major and minor source permit files and to complete a file questionnaire for at least a minimum number of the files that were actually reviewed. EPA then took the completed questionnaires and entered them into a computerized data base from which further analyses were performed.

This audit report chapter covers seven major topics. These topics are the same ones addressed during the last two national audits and are the topics originally selected by the NSR audit committee in FY 1983. This chapter presents the major audit findings under each of the seven NSR topics.

EPA conducted onsite NSR audits of 57 air pollution control agencies, including 44 States[1], Puerto Rico, the Virgin Islands, and 11 local government programs. Altogether, these audited agencies processed approximately 13,115 permits for new and modified sources of all types and sizes during the approximate period upon which this audit report is based. EPA auditors spent approximately 1,140 hours examining 602 permit files. Auditors carried out a comprehensive examination of about 56 percent of these files by completing detailed questionnaires in accordance with the FY 1986-87 NAAS guidance. These questionnaires were then forwarded to EPA Headquarters, keyed into a computerized audit data base, and analyzed to prepare this national audit report.

This year's audit findings support many of the findings from the FY 1985 NSR audit. That is, the findings again indicate that most agencies perform their overall new source review program responsibilities reasonably well, although, in a number of State and local agencies, problems were identified with respect to the consistent and adequate application of certain specific program requirements. In addition, auditors occasionally mentioned that noticeable improvements had already been observed in the performance of some agencies where specific deficiencies had previously been found. This is certainly to the credit of these agencies in their efforts to improve in-house performance and to strive for a greater level of national consistency.

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[1] The State of California does not have the authority to issue permits and does not implement a preconstruction review program. Instead, all source permitting activities in California are performed by local air pollution control districts.

Public Notification Procedures

Overall, agencies generally complied with the public participation requirements as applied to major sources, although EPA found some inconsistencies in the informational content of the public notices. However, while most proposed permits for NSR/PSD sources were announced to the public for an opportunity to review and comment, the majority of other permits were not. This was demonstrated by the fact that EPA found evidence of public notification in only 36 percent of the non-NSR/PSD permits that auditors examined. Moreover, 29 percent of the agencies reportedly did not issue public notices for any of the non-NSR/PSD permits that were examined (compared to the FY 85 result of 42 percent).

Applicability Determinations

A significant number of agencies continued to experience difficulties with the way that they carry out the source applicability process. EPA believes that approximately 17 percent of the audited permits not reviewed under PSD or NSR requirements probably should have been. In addition, the lack of sufficient file documentation often precluded EPA from adequately evaluating the agencies' applicability determinations.

EPA identified various types of problems, but most pertain to the way that agencies account for a new or modified source's emissions in order to determine whether a major review would be required under either PSD or nonattainment area regulations. One particular problem pertains to the misuse by numerous agencies of the concept of "potential to emit", which involves the use of Federally enforceable permit conditions to properly restrict a source's potential emissions (as is often attempted in order to enable a source to avoid major source review). EPA has initiated training courses to provide agency guidance in the determination of applicability, including the concept of "potential to emit".

BACT/LAER Determinations

Agencies generally did a good job of applying the BACT requirements to PSD sources and applicable pollutants. However, EPA concluded that the quality of the analysis performed to select the level of control defining BACT on a case-by-case basis could be improved in some instances. As was the case in FY 85, EPA also found that when a PSD source was subject to NSPS, agencies had a tendency to accept the use of the applicable NSPS to define BACT. Even though examples of BACT determinations more stringent than NSPS were identified in PSD permits issued by 11 of 22 agencies, BACT was established at levels required by NSPS for approximately 60 percent of the pollutant determinations.

Agencies showed far less tendency to use NSPS for LAER determinations in nonattainment areas. Approximately 25 percent of the time, agencies required pollutants to be controlled at levels more stringent than the applicable NSPS. This is down from the 50 percent figure obtained during FY 85. These findings suggest that BACT and LAER requirements do not yet have the technology-forcing effect that Congress envisioned when it established the requirements, and that EPA needs to provide more explicit guidance for making BACT/LAER determinations.

Ambient Monitoring

This year's audit substantiated a finding identified during the FY 1985 audit. That is, agencies commonly allow PSD applicants to comply with the preconstruction monitoring data requirements by relying upon existing ambient air quality data instead of new data collected from a special source-operated monitoring network. EPA accepts the use of such existing data if it can meet certain criteria for representativeness. Due to inadequate file documentation, auditors were not able to ascertain whether 7 PSD sources (out of 51 audited PSD permits) were correctly exempted from addressing any ambient air monitoring requirements.

Ambient Impact Analyses

EPA verified that agencies generally required ambient impact analyses to be conducted where needed to ensure protection of the increments and NAAQS. In addition, most agencies generally used or required the use of the appropriate models and model options to complete the NAAQS analyses. However, certain questions arose concerning the quality of these analyses in a number of cases. With respect to both PSD increment analyses and NAAQS analyses, agencies did not appear to consistently give thorough attention to significant emissions from existing sources (major and minor) located within the impact area of the proposed source. Another key problem was the lack of sufficient documentation of the details of the analyses. This prevented EPA from being able to properly evaluate the adequacy of the analyses contained in a significant number of files.

Emission Offset Requirements

Only 19 percent of the audited agencies issued NSR permits to major sources in nonattainment areas during the audit period. EPA's examination of the NSR permits provided no indication of any nationally significant problems. As with other phases of the audit, however, EPA encountered problems with inadequate file documentation and this precluded an adequate evaluation of the full creditability of some of the emission offsets that agencies required.

Permit Specificity and Clarity

This year's audit raises the same concern that was identified in the FY 1985 audit about the enforceability, and more specifically the Federal enforceability, of some of the permits that agencies are issuing. The acceptable use of physical and operational limitations to restrict the year-round operation and production capacity of a source hinges upon the Federal enforceability of the limitations. EPA auditors questioned the enforceability of such presumed limitations in a number of cases where sources had been allowed to avoid major source review.

4.2 INTRODUCTION

For the 1986-87 audit period, EPA continued its focus on the examination of State and local agency permit files. EPA guidance for the NSR audit called for an onsite review of both major and minor source permit files, with the review addressing seven major audit topics. These audit topics, selected by the NSR audit committee, included: (1) Public Notification Procedures, (2) Applicability Determinations, (3) BACT/LEAR Determinations, (4) Ambient Monitoring (PSD), (5) Ambient Impact Analysis, (6) Emission Offset Requirements, and (7) Permit Specificity and Clarity. The results of the 1986-87 NSR audit pertaining to each of these selected topics are reported in the remainder of this chapter.

The information used to develop the NSR audit findings contained herein was collected by EPA Regional Office audit teams using the same questionnaires as were used for the FY 1985 NSR audit, although some revisions to the questionnaires were made to improve their utilization and the quality of data being reported. Four questionnaires were employed as follows: (1) a permit summary questionnaire (Form 1) which was completed by each audited agency in order to summarize the permitting activities during the applicable period covered by the audit, (2) an NSR audit summary questionnaire (Form 2) which was completed by the EPA audit team following the actual onsite audit, and (3) two kinds of permit file questionnaires which were completed onsite to collect information found in a selected portion of the permits issued by the audited agency. Copies of these questionnaires, along with the necessary guidance for completing them, can be found in the FY 1986-87 audit guidance manual prepared by EPA.

The NSR audit considered information obtained from 57 air pollution control agencies, including 44 states[1], Puerto Rico, the Virgin Islands, and 11 local government programs. Where a State program was carried out by one or more offices (i.e., headquarters or central office plus district offices) and more than one of the offices was audited, they were all considered as part of one State program (agency). Local agencies were considered separately, even though there may in some cases have been a dependency on the State agency for certain program operations.

For the time period upon which this report is based, the audited agencies processed approximately 13,115 permits, including 101 PSD and 42 NSR permits. EPA, in turn, examined 80 percent of the PSD permits, 24 percent of the NSR permits, and about 4 percent (504) of the other (non-NSR/PSD) permits.

While each auditor was encouraged to examine as many permit files as he or she could, the NAAQS audit guidance did not require the completion of a questionnaire for each permit file that was examined during the audit. Instead, a certain minimum number of PSD, NSR, and non-NSR/PSD source questionnaires was prescribed. The total number of permit file questionnaires submitted to EPA Headquarters, and subsequently keyed into a computerized data base and analyzed to prepare the enclosed audit findings, represents about 56 percent of the number of files actually examined. Reference to a percentage of the "total number of audited files" as used throughout this report refers only to those permits that were included in the EPA Headquarters data base, as follows: 51 PSD permits, 17 NSR permits, 6 permits involving both PSD and NSR, and 273 non-NSR/PSD permits.

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[1] The State of California does not have the authority to issue permits and does not implement a preconstruction review program. Instead, all source permitting activities in California are performed by local air pollution control districts.

Some findings of general interest are:

- Twenty-eight (28) agencies issued NSR/PSD permits, no NSR/PSD permits at all were issued by 17 of the audited agencies, and one agency accounted for greater than 20 percent (21 permits) of PSD permits.
- Agencies issued permits to an estimated 756 sources whose potential emissions ranged from 100 to 249 tons per year (TPY), but whose preconstruction review is typically categorized as a "minor" source review. This is because these sources, locating in attainment or unclassified areas, are not subject to Federal PSD requirements, i.e., they are not listed under 40 CFR 51.24(b)(1)(i)(2). Consequently, for them to be classified as "major" PSD sources, each would have to emit at least 250 TPY of any regulated pollutant.
- EPA auditors spent approximately 1,140 hours primarily examining agency permit files. On the average, auditors spent 20 hours per agency audit and nearly 2 hours on each permit file. Actual review time for individual files ranged from 30 minutes to an unusually high 25 hours.

Finally, auditors were asked, on the audit summary form, to identify from their own overall perspective, the five most significant problems encountered for each agency audit. From the lists of problems submitted, five specific problem areas stood out as being the most often mentioned. They are:

Problem Area	Frequency of Occurrence	Percent of Total
o Applicability Determinations	32	26
o Permit Conditions	31	26
o Impact Analysis	16	13
o BACT/LAER Determinations	12	10
o Public Notification Procedures	10	8
	101	83

Two other problem areas collectively constituted 5 percent of the total responses: ambient monitoring and offset requirements.

4.3 SUMMARY OF MAJOR FINDINGS

This section summarizes the major findings of the FY 1986-87 NSR audit. These findings are presented for each of the seven audit topics subject to review. Where appropriate, this year's audit findings are compared to the findings from the previous audit period to identify where improving or worsening performance trends may be occurring. For a better understanding of how the major findings were derived, the reader is referred to sections 4.4 through 4.10, where a breakdown of the individual audit questions and responses is provided.

Public Notification Procedures

- While most proposed permits for NSR/PSD sources are announced to the public for review and comment, most other permits are not. EPA found evidence of public notification in only 36 percent of the non-NSR/PSD source permits that were examined. Agency rules excluded approximately half (53 percent) of the minor source permits from the public notification process. (See Figure 4.1.)

- Approximately one-third of the audited agencies issued public notices for all permits reviewed, and one-third issued notices for some, but not all, of their audited permits. Twenty-nine (29) percent of the audited agencies did not issue public notices for any non-NSR/PSD permits that EPA reviewed. (See Figure 4.1.)

- Sixty-four (64) percent of the agencies that issued PSD permits routinely included the information required by regulation for public notices. Sixty (60) percent of the public notices for PSD sources included all of the information required by the PSD regulations. The information most frequently omitted was the description of the source's estimated ambient impact, including the amount of PSD increment that would be consumed.

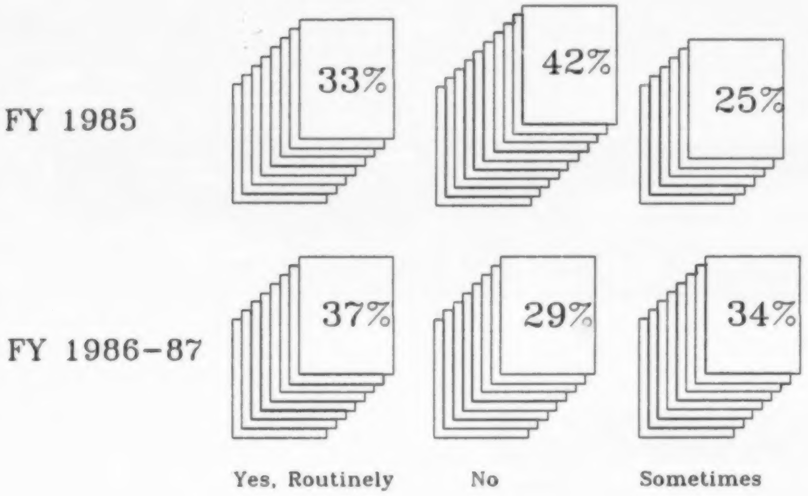
- Federal Land Managers were not always notified of PSD construction that might adversely affect Class I areas. Eleven (11) of 16 PSD permits involving construction within 100 km of a Class I area were brought to the attention of the appropriate Federal Land Manager. No record of notification was apparent in the remaining five permit files -- each issued by a different agency.

Applicability Determinations

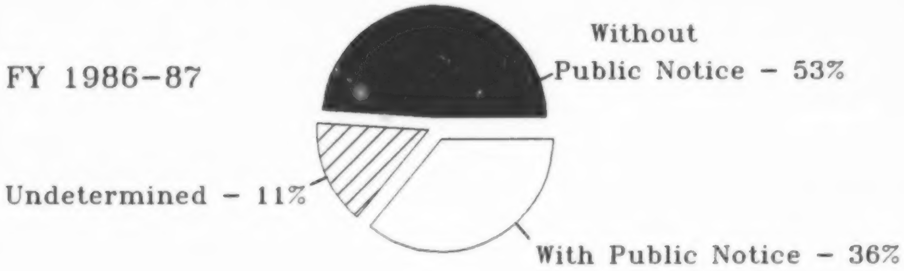
- A significant number of agencies are experiencing difficulties in adequately carrying out the source applicability process. EPA believes that approximately 17 percent of the audited non-NSR/PSD permit files involved sources that probably should have been reviewed as major sources. A lack of adequate file documentation often prevented EPA from adequately evaluating the agencies' applicability determinations.

- EPA found examples where seven agencies (approximately one-half of the FY 85 total) either failed to consider certain pollutant-emitting activities at a source, or improperly interpreted an exemption provision. Only in the latter case, however, were sources enabled to avoid major source review. (See Figure 4.2.)

Did Agency Issue Public Notifications?
Percent of Agencies

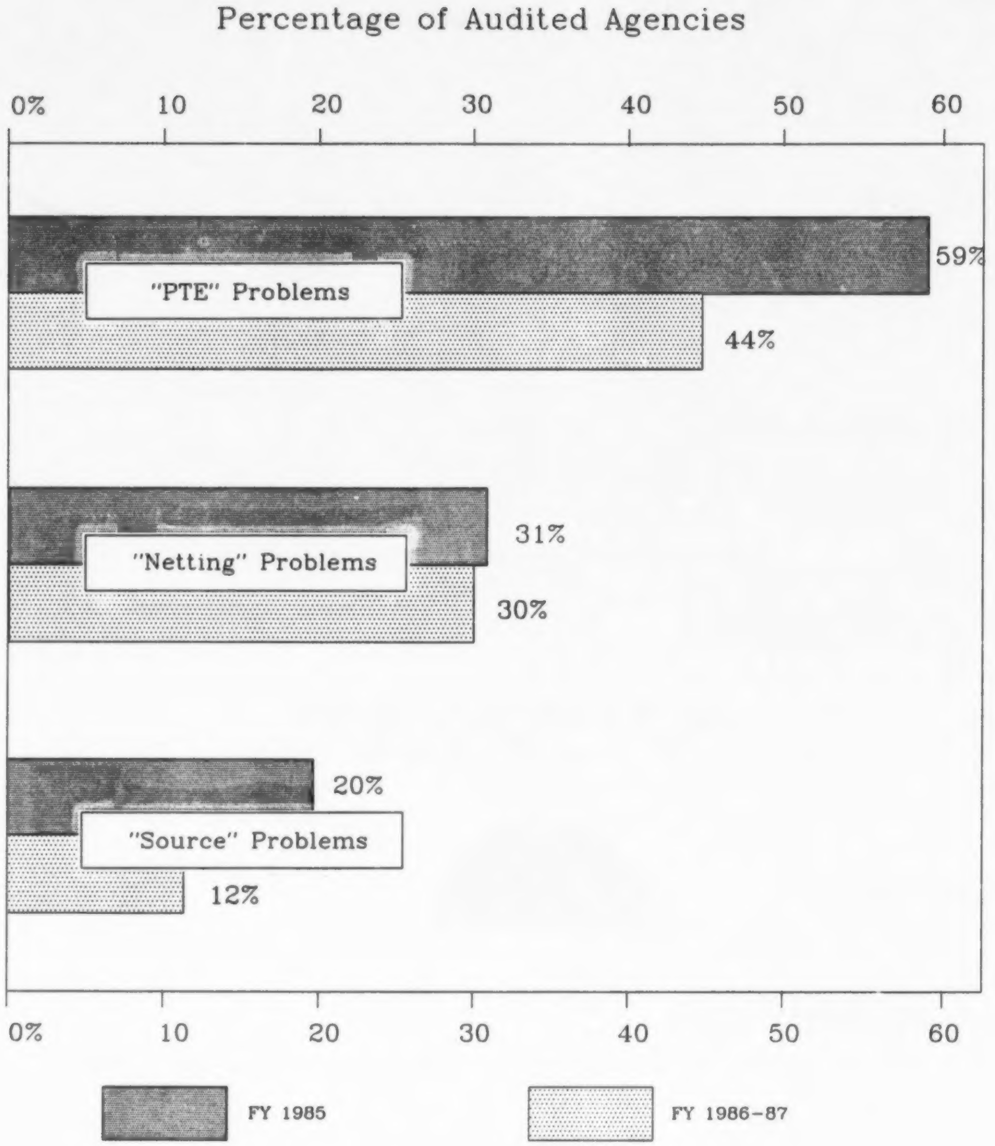


How Were Permits Issued?
Percent of Permits



Above information based only on non-NSR/PSD permits

FIGURE 4.1. AGENCY PERFORMANCE ON PUBLIC NOTIFICATION



Percentages are mutually exclusive and based on 64 total audited agencies during FY 1985, and 57 total audited agencies during FY 1986–87.

Figure 4.2. APPLICABILITY DETERMINATIONS – AGENCY PERFORMANCE

- Agencies continue to have problems properly defining a new or modified source's "potential to emit." Twenty-five agencies had permit files that EPA considered to be deficient in some respect concerning the calculation or use of potential emissions for source applicability purposes. Sometimes, but certainly not always, these problems resulted in agencies not subjecting proposed sources to the correct preconstruction review requirements. As Figure 4.2 illustrates, this represents a significant decrease from the FY 85 audit findings.

- EPA identified 17 agencies that either did not require the proper "netting" procedures to be followed to calculate the change in emissions at a modified source, or did not provide sufficient file documentation to enable adequate evaluation of the agency's procedures. In these agencies, EPA found at least 49 files with procedural or documentation problems. (See Figure 4.2.)

- EPA found no evidence of the improper "double counting" of emission reduction credits used for netting purposes. Some agencies need to be more careful about ensuring that each emission reduction credit is made Federally enforceable--an important criterion for properly using emission reductions for netting purposes.

BACT/LAER Determinations

- Most agencies routinely complied with the PSD requirement for applying BACT to each regulated pollutant emitted in significant amounts. EPA found exceptions in a total of 14 permits issued by 11 agencies. In only three agencies did the problem occur in more than one permit.

This year's audit findings generally support the agencies' claims in that most (65 percent) of the audited PSD files (at 86 percent of the agencies) did address, to some degree, consideration of alternative control techniques (Figure 4.3). Specifically, auditors found that:

- Fifty-seven (57) percent of the agencies where PSD permit files were examined had files in which control alternatives were routinely considered;

- Twenty-nine (29) percent had some files that addressed alternatives and other files that did not;

- Fourteen (14) percent of the agencies had no PSD files that addressed alternative controls for BACT; and

- Sixteen (16) percent of the PSD files where control alternatives for BACT were considered failed to adequately address the impacts for each alternative in order to demonstrate the rationale for selection of a particular control technique.

- Collectively, agencies showed a tendency to accept the use of the applicable NSPS to define BACT for PSD sources. Even though examples of BACT determinations more stringent than NSPS were found in PSD permits issued by 11 of 22 agencies, BACT was established at levels required by

NSPS for approximately 60 percent of the pollutant determinations for BACT (Figure 4.4.)

- Agencies showed far less tendency to use the NSPS level for LAER determinations than for BACT. Agencies required emission limits more stringent than NSPS to establish LAER in six of seven pollutant determinations, affecting five major nonattainment area sources otherwise subject to NSPS.

Ambient Monitoring

- With only a few possible exceptions, agencies typically required PSD applicants to address the preconstruction monitoring requirements where applicable. Where agencies did exempt PSD applicants from the requirements, permit files usually provided an adequate demonstration that the proposed sources' impacts were *de minimis*. For 14 approvals made by 9 agencies, however, the auditors believed that the sources should have been required to submit ambient air quality data instead of existing representative data.

- Nineteen (19) agencies required a total of 28 applicants to comply with the preconstruction monitoring requirements. Twenty-six PSD applicants were allowed to use only existing ambient air quality data. Two agencies each required one PSD applicant to monitor for one or more pollutants.

- In approximately 20 percent of the cases where agencies accepted the use of existing data, the permit files (a) offered no documented basis for allowing its use, or (b) contained some description of the data but failed to adequately address or meet all of the EPA criteria for representative data.

Ambient Air Quality Analysis

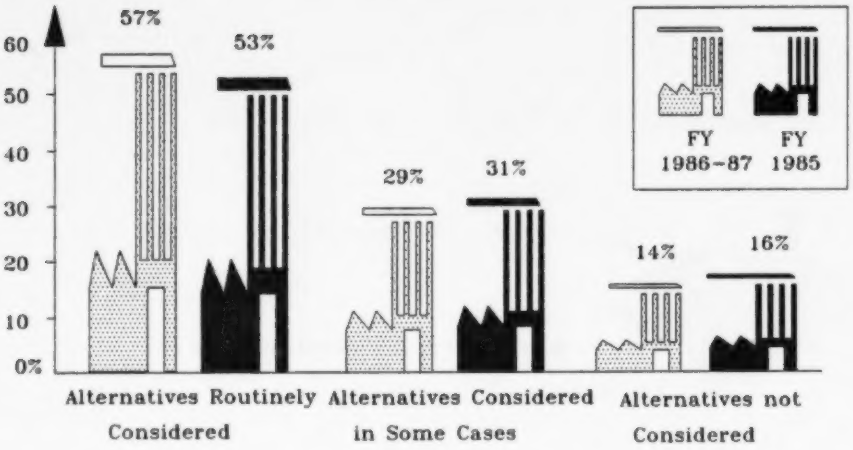
PSD Increment Analysis--

- Twenty-three (23) agencies required 32 PSD applicants to meet either the TSP or SO_2 increments, or both. In only one case did an auditor find that an increment analysis (Class II for SO_2) should have been performed. However, in more than half of the affected agencies, EPA found that either: (a) the analyses did not adequately address existing major and minor source emissions which also consumed increment, or (b) the permit files did not provide sufficient information to enable auditors to evaluate the analyses. (See Figure 4.5.)

- Agencies typically gave adequate consideration to both long- and short-term PSD increments and tended to be conservative in their use of modeling results.

NAAQS Protection--

- EPA auditors identified three NSR/PSD permits for which an NAAQS analysis was completely omitted but should have been required. However, five agencies were found to have (a) incorrectly omitted certain pollutants



Statistics based on agencies issuing PSD permits

FIGURE 4.3. BACT DETERMINATIONS: Consideration of Control Alternatives

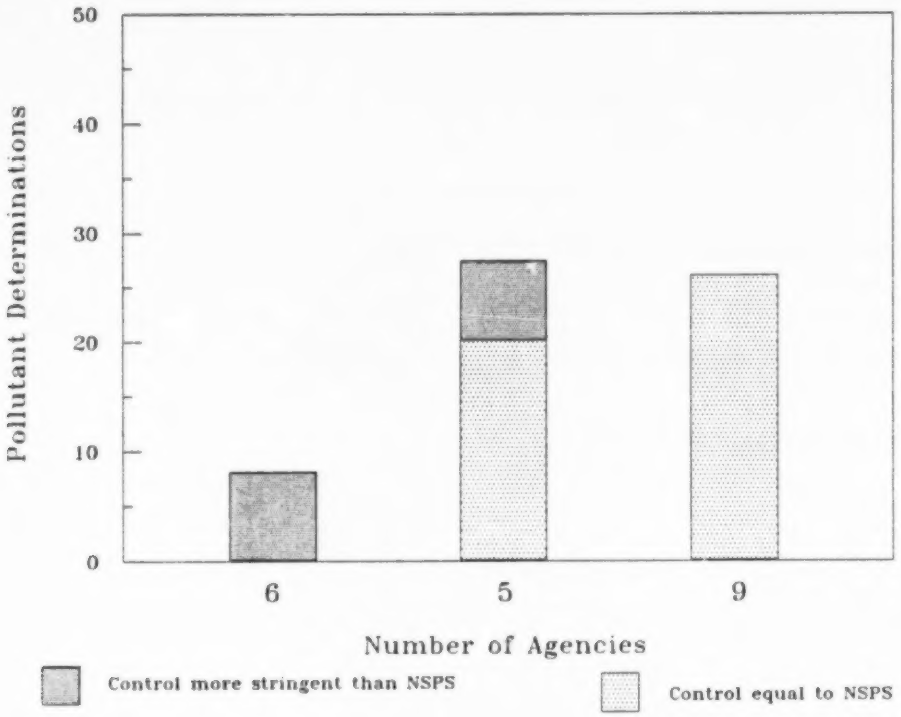
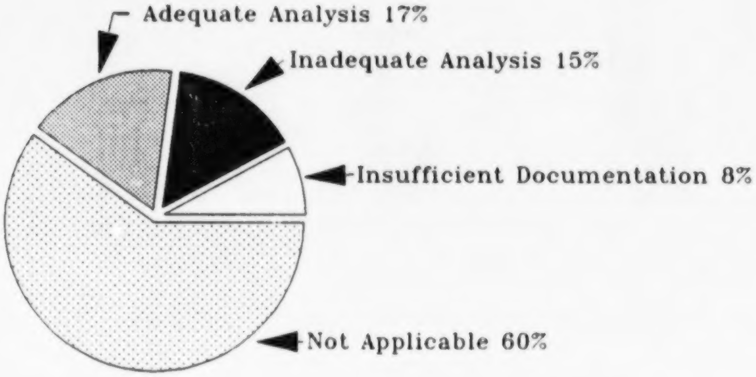
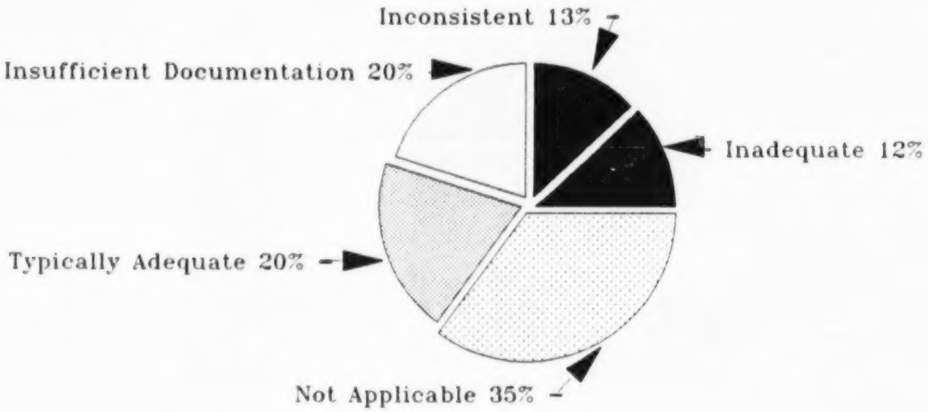


FIGURE 4.4. RELATIVE STRINGENCY OF BACT DETERMINATIONS



PSD Increment – Percent of Agencies



NAAQS Protection – Percent of Agencies

FIGURE 4.5. AGENCY PERFORMANCE ON AMBIENT AIR QUALITY ANALYSIS

from analysis, or (b) lacked a sufficiently comprehensive review of some pollutants.

- Four agencies, each having a PSD file that included an NAAQS analysis, should have required additional analyses, either for omitted pollutants or for more comprehensive review of considered pollutants.

- Most agencies appear to scrutinize non-NSR/PSD source permit applications individually to detemine whether an NAAQS analysis should be done. However, 16 agencies were found to have issued permits to sources that probably should have been subjected to NAAQS analyses, but were not. EPA identified a total of 16 permits for which this omission occurred.

- Thirty-two (32) percent of the agencies typically had files that either: (a) lacked sufficient documentation to enable EPA to determine whether and to what degree source interactions had been considered in the NAAQS analysis, or (b) omitted significant emissions from other sources in the vicinity of the proposed source. (See Figure 4.5.)

Dispersion Models--

- Most agencies generally used or required applicants to use the appropriate models and model options in the NAAQS analyses performed. However, the lack of sufficient documentation to fully describe the rationale for the use of particular models and the methods used was a hindrance to the auditors in many instances.

- Apparently, most agencies do not often require minor sources to perform the modeling analysis. Seventy (70) percent of the time, the minor source analyses were performed by the agencies themselves; but in the 18 cases where the applicants did submit the analyses, adequate checks by the responsible agency occurred 80 percent of the time.

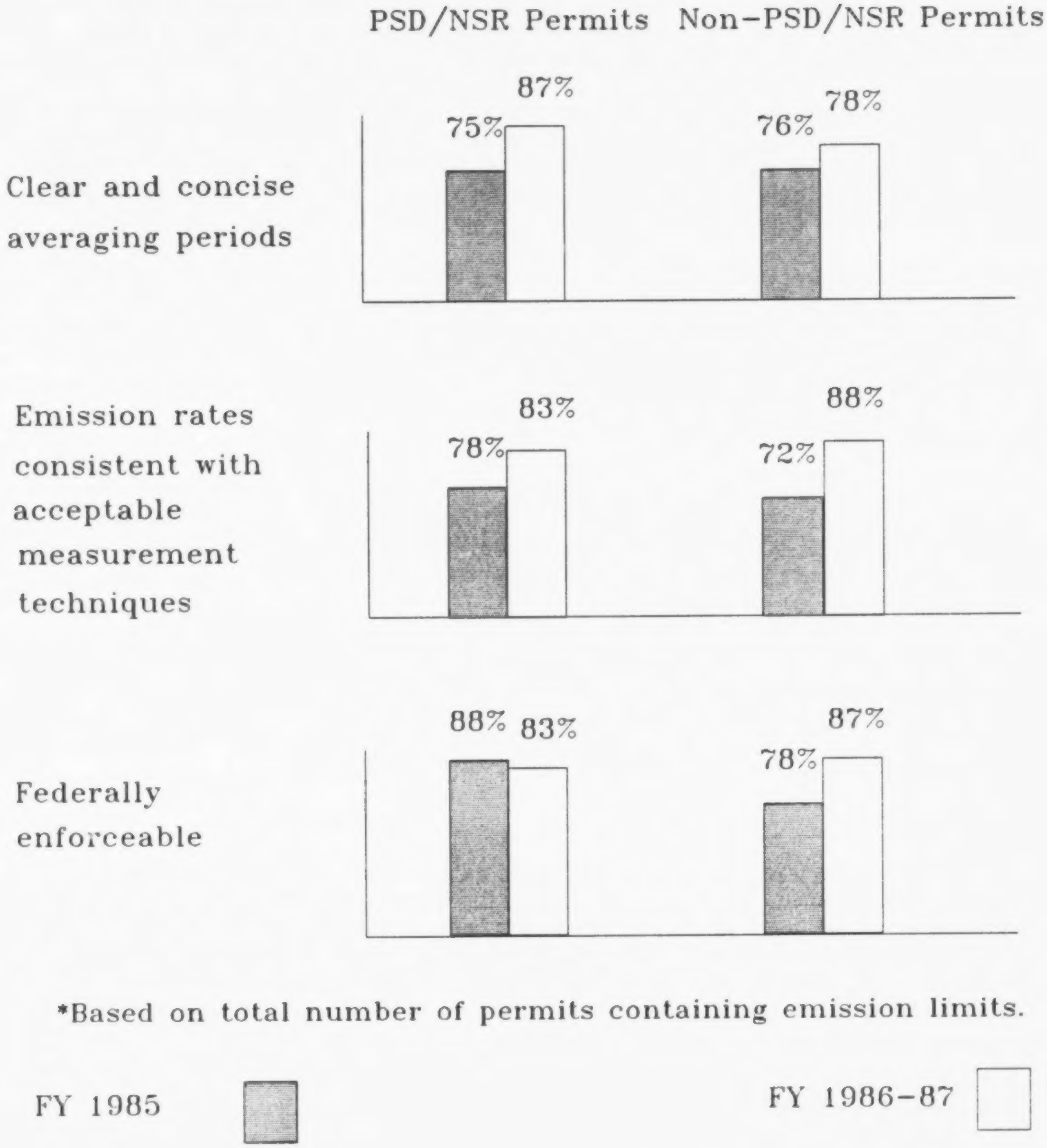
Emission Offset Requirements

- Eleven agencies issued NSR permits to major sources in nonattainment areas. EPA found a few examples of areas where agencies experienced specific problems and one case where the Federal enforceability of an offset granted was questionable. Agencies typically required offsets to occur on or before the time of new source operation and to be expressed in the same manner as emissions used for the demonstration of reasonable further progress.

Permit Specificity and Clarity

Where limits were specified in the permits, auditors were asked to evaluate them in terms of their (1) clarity, (2) consistency with measurement techniques, and (3) Federal enforceability. The results are presented in Figure 4.6. With regard to these three criteria, the FY 86-87 results show almost universal improvement over the results of FY 85.

- Thirty-five agencies did not appear to routinely state or reference each source's allowable emissions in the applicable permit. The



*Based on total number of permits containing emission limits.

FIGURE 4.6. CONDITION OF ISSUED PERMITS

omission appeared to be a common occurrence, at least for non-NSR/PSD sources, in 13 of these agencies.

- At least 13 agencies did not appear to identify routinely each emission unit along with its allowable emission limit in the permits. In some cases, it may be agency policy to do so primarily for PSD permits or where needed to avoid NSR/PSD review.

- Eighteen agencies reportedly either did not at all or did not consistently state or reference compliance test methods in the permits. Where the practice is not followed consistently, it is not clear what criteria, if any, agencies use to determine whether the methods are to be stated or referenced in the permits.

4.4 PUBLIC NOTIFICATION PROCEDURES

The audit examined State and local agency procedures for notifying the public of proposed permit actions. The procedures were reviewed with specific concern for (1) the type of sources for which notices were issued, (2) the adequacy of the information contained in the notices, and (3) the extent to which other agencies and officials are informed of pending permit actions that could affect the air quality in their jurisdictions.

1. For which new or modified sources was the public afforded an opportunity to comment on proposed permits?

The FY 1986-87 NSR audit findings indicate that, while most proposed permits for NSR/PSD sources are announced to the public for comment, most other proposed permits are not. Approximately 90 percent of the NSR/PSD permits examined by the auditors were announced through a public notice. This percentage represents no change from the FY 85 results.

In contrast to the results for NSR/PSD permits, auditors found many non-NSR/PSD permits for which there was no evidence of public notification; only 36 percent of the audited non-NSR/PSD permit files included public notices. Auditors concluded that 53 percent had been exempted from notification by agency rules, while 5 percent of the permits that were not subject to public notification should have been subject under agency rules. Fifteen (15) percent of the questionnaires contained no response at all to this question, primarily because of the lack of documentation in the files. None of these percentages cited represents a significant change from the FY 85 audit results.

In terms of public participation requirements, it was found that EPA auditors responded to procedures regarding issuance of public notice for 40 of the 57 agencies audited. Of the agencies for which responses were recorded, this year's findings reveal that:

- 37 percent of the agencies issued public notices for all of the permits that EPA examined

- 34 percent issued public notices for some, but not all, audited permits (compared to 25 percent for FY 85)

- 29 percent did not issue public notices for any of the audited non-NSR/PSD permits (compared to the FY 85 result of 42 percent).

In order to help assess the general value of public notification for non-NSR/PSD permits, auditors were asked to indicate whether the public notices resulted in any comments. Of those minor permits for which a public notice was issued, the files contained no evidence that public comments had been submitted.

2. Do the public notices routinely provide adequate information?

Auditors were asked to determine whether the following items of information, required under the PSD regulations, were included in the public notices issued by State and local agencies:

- Opportunity for written comment
- Opportunity for a public hearing
- Description of the agency's preliminary determination to approve or disapprove the permit
- Description of the source's estimated ambient impact
- Statement of the availability of additional information for public inspection.

Of the 28 agencies issuing PSD permits during the FY 1986-87 audit period, 64 percent routinely addressed the information requirements in an adequate manner. Specifically, 60 percent of the public notices issued for PSD permits by these agencies included all of the required information. The remaining 36 percent of the agencies were inconsistent at best. The most frequently omitted information was the description of the source's estimated ambient impact, including the amount of PSD increment that would be consumed. This omission continues a trend from the previous audit results. Overall, approximately one-half of the public notices for PSD permits were found to contain all of the required information outlined above.

Other types of permits, including those subject to major review in a nonattainment area, typically did not contain all the items of information listed above. For example, the description of the source's estimated impact was frequently omitted.

3. Were other State and local air pollution control agencies, and other officials whose jurisdictions might be affected by the proposed new or modified source, adequately notified of the proposed action?

Auditors identified 11 agencies where it did not appear that this part of the notification procedure was being adequately carried out. In some cases, it was not apparent that outside agencies or officials had been notified. With regard to the NSR/PSD files, it appeared that EPA and other agencies within the State were notified when appropriate over 90 percent of the time. This percentage fell to less than 50 percent for the non-NSR/PSD permits. In most cases, the NSR/PSD permit files contained evidence of notification. This documentation was missing from the non-NSR/PSD files more than half of the time.

EPA policy calls for notification of the appropriate Federal Land Manager (FLM) when a PSD source proposes construction within 100 km of a Class I area. Sixteen PSD permits met this criterion. Auditors verified that 11 of the 16 PSD permits were brought to the attention of the appropriate FLM. No record of notification was apparent in the remaining files, each issued by a different agency.

4.5 APPLICABILITY DETERMINATIONS

The specific types of requirements that are to apply to a proposed new source or modification are generally based on the size of the new source or modification, expressed in terms of its "potential to emit" and the geographic location where the proposed construction would occur (attainment vs. nonattainment area). The task of making the appropriate applicability determination depends upon the existence of adequate regulations containing the proper definitions and applicability criteria, plus the in-house expertise for correct application to each permit application.

EPA auditors examined the selected permit files to evaluate each agency's ability to adhere to the approved definitions of "source" and "potential to emit," and how well each agency verified and corrected, where necessary, the emissions estimates provided by the applicants. As was the case in the FY 85 audit, the overall findings pertaining to applicability determinations suggest that a significant number of State and local agencies are experiencing difficulties in adequately carrying out the source applicability process. Overall, EPA found that:

- Approximately 17 percent (40 permits) of the audited non-NSR/PSD permit files should have been reviewed as major sources, in the auditors' judgment. This represents a slight increase over the FY 85 results.

- Another 5 percent of the audited non-NSR/PSD files did not contain sufficient information about the sources' emissions to enable the auditors to indicate whether the correct applicability determinations had been made.

- Twenty-one (21) agencies had at least one source that should have been reviewed as major.

Described below are the findings as they relate to the various aspects of the applicability determination process.

1. Does the agency properly apply its approved definition(s) of "source"?

EPA found, in seven agencies, nine non-NSR/PSD permits for which certain pollutant-emitting activities had not been considered in defining the subject source. Four sources, in four agencies, escaped review because new or modified pollutant-emitting activities were not included in the definition of source. Twelve (12) permits at 10 agencies did not have sufficient information to determine if the source escaped review due to the omission of a pollutant-emitting activity.

EPA did, however, identify other problems that, while not related to the definition of source, involved other source-related issues. These source-related problems kept sources from being properly regulated under the agencies' permit requirements. No one problem was widespread, and correction of each would appear to require greater attention on the part of each agency to correctly interpret its applicable regulations. EPA identified the following types of problems:

- incorrect application of the 250 TPY source category criterion;
- the use of external offsets to net out of review; and
- lack of Federally enforceable limits.

2. Does the agency typically use the best available emissions projections and Federally enforceable limitations in defining a source's "potential to emit (PTE)"?

The PTE is a source's maximum capacity to emit a pollutant under its physical and operational design. In order for any physical or operational limitation (e.g., less than a 24-hour, year-round operation fuel usage restriction) to be considered part of the source's design (thereby restricting the maximum pollutant-emitting capacity of the source), the limitations must be Federally enforceable. The major status of new or modified sources must be determined on the basis of their potential emissions.

Twenty-five (25) agencies (44 percent of all audited agencies) were found to have a problem with their procedures for establishing a source's "potential to emit" (PTE). This represents a significant decrease from the FY 85 audit total of 59 percent of all audited agencies. Sometimes, but certainly not always, these problems appear to have resulted in incorrect applicability determinations. Problems related to agencies' determinations of PTE can be broken down as follows:

- failure of 28 permits (17 agencies) to ensure the Federal enforceability of all physical and operational limitations used in the PTE calculations;
- use of emission factors in four permits (four agencies) that are not well-established or well-documented; and
- failure to include quantifiable fugitive emissions in five permits from five agencies. However, no source escaped major review because fugitive emissions that should have been included were not.
- Twenty-nine (29) permits in 18 agencies were found by the auditors to lack sufficient documentation for a determination of whether PTE was correctly calculated.

For any one or more of these reasons, EPA considered the PTE determination in approximately 25 percent of the audited non-NSR/PSD source files to be deficient. More importantly, at least 18 percent of the files where EPA found deficiencies reportedly should have been reviewed as major sources. This figure represents a slight decrease from the 20 percent figure obtained from the FY 85 audit.

In 38 agencies, EPA found permit files for which the agencies (a) did not properly ensure the Federal enforceability of all physical and operational limitations upon which emission estimates were calculated, or (b) did not adequately consider the potential emissions of existing facilities where a modification was being proposed.

EPA identified at least 14 permits where the agencies simply did not establish permit conditions defining the necessary limitations upon which the sources' estimated emissions were based. In other permits, some necessary limitations were either not addressed at all or were inadequately restricted. Sometimes the limitations were specified in operating permits which EPA generally does not regard as being Federally enforceable, but which are usually enforceable by State and local agencies.

It is also important to point out that some agencies consider the limitations to be enforceable if they are contained in the permit application. Apparently, some agencies include in permits a general condition that links the applicants' plans and specifications to the permits. It is not clear when and how often auditors took this into account when evaluating the Federal enforceability of the limitations.

In cases where a permit involved a modification to an existing source, EPA sometimes found that no determination of the existing source's PTE was made. While it is true that the existing source's PTE is irrelevant for the immediate applicability determination, when the proposed emission increases would not exceed prescribed significance levels, it is nevertheless important to know what the source's cumulative PTE is for consideration in subsequent modification proposals by that source. As was the case in the FY 85 audit, some files did not appear to contain any documentation of the existing source's PTE or of cumulative emissions for future reference.

Nine (9) agencies issued 11 permits (4 percent of the audited non-NSR/PSD source files) that did not adequately address fugitive emissions; however, no source escaped major review because emissions which should have been included were not. Fourteen (14) percent of the non-NSR/PSD source files did not provide sufficient documentation of the emission calculations to enable EPA to verify whether fugitive emissions were properly considered.

3. Does the agency use as its netting baseline actual emissions expressed in tons per year?

No specific problems involving the NSR/PSD permit files were found. Auditors did indicate, however, that insufficient documentation prevented an affirmative conclusion from being drawn in just a few cases.

With respect to the non-NSR/PSD files, EPA identified 17 agencies that either did not require the proper procedures to be used to calculate a net change in emissions, or did not provide enough information to enable the auditors to determine whether actual emissions were correctly calculated. In these agencies, EPA found at least 49 examples of specific procedural or documentation problems. The findings indicate that:

- Five agencies allowed proposed modifications to determine their net change in emissions on the basis of potential or allowable emissions, rather than actual emissions. At least two of the agencies permitted new replacement units, of equal capacity to units being shut down, without considering the net change in actual emissions.

- Six agencies did not properly determine actual emissions changes--one failed to use a tons-per-year emission baseline, while five did not use emissions that were representative of normal source operation.

- Twelve agencies did not provide sufficient information in some files to enable the auditors to determine how the emission changes were calculated.

4. Does the agency check applications for proper use of contemporaneous emission changes to prevent the "double counting" of emission decreases for netting purposes?

No evidence of double counting was found in the audited permit files. Of some concern, however, is (1) the lack of documentation verifying that double counting has not occurred, and (2) the apparent failure to make the emission reduction credits Federally enforceable (eight permits).

The lack of documentation was indicated in six agencies as the reason why auditors could not verify that double counting had not occurred, but it should be noted that there were no suggestions that any problems were suspected.

EPA requirements stipulate that emission reductions must be made Federally enforceable. This was reportedly not done in single permits found in seven agencies. In three of these agencies, emission reduction credits were not addressed at all in permit conditions, thus raising the question of whether the reductions are enforceable even by the affected agencies. Making the emission reductions enforceable conditions of the permit also helps to ensure that subsequent double counting of such emissions will not occur inadvertently.

5. Does the agency properly apply the §107 area designations when determining what type of preconstruction review will be required of major construction?

No clear examples of the misapplication of §107 area designations were identified by EPA auditors.

6. Verify that the agency does not approve major construction projects in designated nonattainment areas under an EPA-imposed construction moratorium.

The findings indicate that none of the audited agencies had issued permits to sources locating in nonattainment areas where EPA had imposed construction bans.

4.6 BACT/LAER DETERMINATIONS

In this section, the audit examined several aspects of the BACT/LAER control technology requirements that are generally applicable to PSD sources and major new and modified sources in nonattainment areas. With respect to BACT, emphasis was put on whether agencies were requiring an adequate analysis of each regulated pollutant emitted in significant amounts. Prescribed significance thresholds applicable to each pollutant are defined by the PSD regulations.

In order to get a better idea of how thoroughly the BACT analyses are being carried out, questions were asked to determine whether the analyses routinely considered more than one possible control technology, and whether the agency routinely took it upon itself to verify the analyses submitted by the applicants.

The audit also sought to determine the extent to which the BACT/LAER requirements are functioning as technology-forcing requirements. This was accomplished by asking the auditors to determine the relative stringency of the BACT/LAER determination for each major source audited on the basis of applicable NSPS and NESHAP standards, which serve as the minimum control requirements legally allowed for BACT and LAER.

1. Does the BACT analysis consider each regulated pollutant emitted in significant amounts?

Most of the 28 agencies that issued PSD permits appear to be complying with this PSD requirement. The auditors found exceptions, however, in a total of 14 PSD permits issued by 11 agencies. These figures represent a higher percentage of the audited PSD permits than was found in the FY 85 audit. In only three agencies did the problem occur in more than one permit. In almost all cases where the BACT analysis was considered, BACT was specified in the permit.

Some pollutants were not considered for BACT because of an apparent failure on the part of the audited agencies to address potential emissions; i.e., actual emissions were incorrectly used (see Section 4.5, Applicability Determinations). It is presumed that in such instances when this practice is corrected, any pollutants calculated to be potentially emitted in significant amounts will be properly considered for BACT.

2. Does the review agency require consideration of more than one BACT control technology? If so, to what extent are economic, energy, and non-air environmental impacts considered?

Previous audits indicated that most agencies appear to require PSD applicants to analyze more than one control technique as part of their BACT selection process. Some agencies have noted, however, that this requirement was not always implemented if a particular control technique was regarded as "obvious" or common for a particular source. A few agencies have claimed that a preapplication meeting with the applicant was used to determine BACT; therefore, an analysis of alternatives was not needed for the PSD application. Where agencies claim to conduct a preapplication meeting with the applicant in order to review candidate control options in advance, EPA recommends that each meeting be carefully documented to include a description of the alternatives considered and the basis for them being eliminated. Agencies should retain this documentation in the appropriate PSD files as a formal record of the BACT selection process.

This year's audit findings generally support the agencies' claims in that most (65 percent) of the audited PSD files (at 86 percent of the agencies) did address, to some degree, consideration of alternative control techniques. Specifically, auditors found that:

- Fifty-seven (57) percent of the agencies where PSD permit files were examined had files in which control alternatives were routinely considered;

- Twenty-nine (29) percent had some files that addressed alternatives and other files that did not;

- Fourteen (14) percent of the agencies had no PSD files that addressed alternative controls for BACT; and

- Sixteen (16) percent of the PSD files where control alternatives for BACT were considered failed to adequately address the impacts of each alternative in order to demonstrate the rationale for selection of a particular control technique.

Seventeen (17) PSD permits (33 percent of the PSD permits audited), issued by 13 agencies, did not address alternative controls at all. Auditors noted that in some cases the applicant claimed the best control(s) had been selected. For nine cases from seven agencies, the auditors found that even though only one option was reviewed, the option was found by the auditor to be acceptable. In some cases where the source was subject to NSPS, auditors noted that no other control technology was considered for BACT. Thus, it would appear that the omission of other control techniques from consideration may not always be acceptable.

3. What checks does the review agency employ to confirm the applicant's BACT analysis?

Auditors were asked to determine whether each audited PSD file contained sufficient documentation to show that the reviewing agency had verified the applicant's calculations and assumptions for BACT. The findings show that:

- Sixty (60) percent of the agencies consistently verified the applicants' BACT analyses;

- Twenty (20) percent were inconsistent in that some files demonstrated the agencies' verification efforts while other files did not; and

- Twenty (20) percent provided no evidence in their files that they had verified the BACT analyses submitted by the applicants.

Auditors found no apparent agency verification of the applicants' BACT analyses in 15 PSD permit files. This finding was mixed between situations where only one control technology was considered and others where several alternatives were considered by the applicant. The auditors concluded in some cases that little independent analysis was likely to have occurred because of the questionable nature of the BACT selections. In other instances, however, it appeared to be more a question of whether the agencies had failed to adequately document their own analyses.

4. What tendency is there for the agencies' BACT/LAER determinations to conform exactly to the minimum requirements, i.e., NSPS or NESHAP standards where applicable?

For this question, applicable PSD files were examined for the application of BACT, and files for major nonattainment area sources were examined for LAER. The findings are based on 30 PSD files from 22 agencies and 5 major nonattainment area source files from 4 agencies.

a. BACT

Some improvement was found over the FY 85 audit; however, there is still a tendency for agencies to accept the use of the applicable NSPS to define BACT for PSD sources. Even though examples of BACT determinations more stringent than NSPS were found in 11 of 22 affected agencies, BACT was defined as the applicable NSPS for approximately 60 percent of the pollutant determinations that agencies made for PSD sources subject to NSPS.

The audit findings show that:

- Nine agencies accepted the applicable NSPS for all BACT determinations. These agencies issued 10 permits, for which 26 pollutant determinations were made.

- Five agencies defined BACT more stringently than the applicable NSPS for at least one pollutant, but typically accepted NSPS for most pollutant determinations. In the nine permits that these agencies issued, BACT was set at levels more stringent than NSPS for seven pollutants, while the NSPS level was applied to 20 pollutant determinations.

- Six agencies defined BACT more stringently than the applicable NSPS for all of their BACT determinations. These agencies issued seven PSD permits, for which eight pollutants were controlled beyond NSPS.

- Of 30 PSD sources subject to NSPS, 12 were allowed to use NSPS for all affected pollutants, while 9 were required to meet control requirements more stringent than BACT for all affected pollutants; however, only 1 of these sources had more than 1 pollutant subject to BACT.

- EPA auditors did not address the stringency of BACT relative to the applicable NSPS in three permits from three agencies. However, all other BACT determinations at two of the agencies were more stringent than the applicable NSPS. The third permit contained a BACT determination less stringent than the applicable NSPS for one pollutant and a "not determined" for another subject pollutant.

b. LAER

Agencies showed a significantly greater tendency to define LAER beyond the applicable NSPS than was the case for BACT determinations. Though a smaller sample of nonattainment NSR permits was taken, an even greater percentage of LAER determinations exceeded the applicable NSPS than in the FY 85 Audit. For the five permits issued, LAER was defined to be more stringent than NSPS for six pollutants, while the control of only one pollutant was set equal to NSPS.

Only one agency allowed one source to meet the applicable NSPS to satisfy the LAER requirement for a single pollutant. The other three agencies required LAER to be set at levels more stringent than NSPS for four sources.

4.7 AMBIENT MONITORING (PSD)

The PSD regulations contain specific *de minimis* ambient concentrations for each pollutant, indicating when a PSD applicant needs to gather ambient air quality data as part of the permit-to-construct application process. For those pollutants which require reporting of ambient data, EPA guidelines set forth procedures whereby a source must either: (1) establish and operate an ambient monitoring network and collect data for 12 months or less, or (2) analyze existing ambient data that are "representative" (in accordance with specific EPA criteria) of the air quality in the impact area of the proposed source.

1. Under what circumstances is a source required to submit preconstruction ambient monitoring data?

The auditors examined 61 PSD files to determine whether agencies had followed the correct procedures for requiring applicants to submit ambient air quality data, either from source-operated monitors or from existing representative data. Twenty-eight (28) sources were required to submit ambient data. Another 26 sources were correctly exempted in accordance with the criteria for *de minimis* situations, but 7 did not address the data requirements.

Seven sources were exempted from preconstruction monitoring requirements; however, because of inadequate documentation in the permit files, auditors were unable to ascertain whether the exemptions, allowed by six agencies, were appropriate.

In the 19 agencies requiring that the data requirements be addressed, most applicants were allowed to use existing air quality data rather than having to establish a monitoring network to collect new data. The findings indicated that:

- Twenty-six (26) sources were allowed to use only existing data. For four of these sources, the existing data were not in the files.

- Two sources (involving two different agencies) were required to measure ambient air quality. Neither the monitoring plans nor the monitoring results were available for either source.

2. Under what circumstances may a source submit existing data, rather than conduct new monitoring?

Where PSD sources were allowed to use existing data to meet the air quality data requirement, auditors examined the files to determine whether agencies followed Federal criteria to ascertain that the existing data were representative of the area of source impact. The air quality data were checked for adequate consideration of the location of existing monitors, as well as the quality and currentness of the existing data.

Four files from four different agencies offered no documented basis for allowing the use of existing data. One other file involving one agency contained some description of the data used but failed to adequately consider, or meet, all of the criteria for representative data.

For the 26 PSD sources allowed to use existing data for at least one pollutant, supporting data were in the files for 23 sources. For these, auditor responses addressing the Federal criteria for representative data are as follows:

	YES (%)	NO (%)	CBD (%)
a. Adequate consideration of monitoring site location	79	4	17
b. Adequate consideration of data quality	79	0	21
c. Adequate consideration of data currentness	80	0	20

3. Do the source monitoring data adhere to PSD quality assurance requirements?

In the two agencies requiring source monitoring, EPA auditors checked the two PSD permit packages but found no monitoring plans. One auditor indicated that a monitoring plan had been submitted for one source, but the plan was not in the permit file. This source conducted monitoring for 12 months, as generally required in the PSD regulations.

4.8 AMBIENT AIR QUALITY ANALYSIS

Auditors were asked to examine three main areas of concern regarding ambient air quality analysis. The first area, PSD increment analysis, looked at how well agencies evaluated PSD permit applications to determine the amount of PSD increment that would be consumed by the proposed source or modification. The second area of concern pertains to agency procedures for providing adequate NAAQS protection. Auditors were asked to determine, for all major and minor source permits, whether and to what extent each source underwent an analysis to ensure that the national standards (NAAQS) would not be violated. Finally, the auditors evaluated the adequacy of the agencies' models and modeling procedures. Agencies are expected to use models that have been approved for use by EPA, but also of importance is that the model (and model options) selected be appropriately applied to a particular set of modeling conditions.

PSD Increment Analysis

Auditors focused on whether the PSD increment analyses (1) addressed the appropriate emission changes that affect available increments, (2) considered both long- and short-term increment averaging periods, and (3) gave adequate attention to Class I area increments.

The audit findings indicate that 23 agencies required PSD applicants to perform increment analyses. In these agencies, 32 PSD permits included analyses of either the TSP or SO_2 increments, or both. In only one case did an auditor find that an increment analysis (Class II for SO_2) should have been performed, but was not.

1. Does the agency consider the baseline concentration and emission changes that affect increment consumption?

- In 6 of the 23 agencies, auditors found that applicants did not address all applicable increment-consuming emissions from existing sources. In all but one case, the permit involved minor source emissions.

- In 11 of the 23 agencies, files contained insufficient information to enable the auditors to satisfactorily evaluate the adequacy of the required increment analyses. In some cases, the increment analysis conducted may have been adequate; however, the available documentation would not allow a determination.

2. Are both long- and short-term PSD increments being given adequate consideration as part of the increment assessment?

The audit findings indicate that agencies adequately consider both the long- and short-term increments for SO_2 and TSP. It is interesting to note that agencies tended to be conservative in their use of modeling results to determine the amount of increment consumed. Whereas EPA recommends using the highest of the second highest receptor site concentrations, agencies used the highest concentration in 67 percent of the TSP analyses and 48 percent of the SO_2 analyses.

NAAQS Protection

1. Does the agency routinely evaluate the ambient impact of minor source construction?

This year's audit information supports the findings of the previous audit in that most agencies do not routinely evaluate minor source construction for air quality effects. Less than 25 percent (60) of the audited minor source files were required to undergo an NAAQS analysis.

Most agencies did, however, appear to scrutinize minor source applications individually to determine whether an ambient impact analysis should be done. Some agencies, however, appear to provide little, if any, review of the ambient effects of minor sources.

Specifically, the audit results indicate that:

- Twenty-five agencies did not require NAAQS analyses for any audited non-NSR/PSD source permits. In four of these agencies, auditors found sources which they believed should have undergone analysis but did not.

- Sixteen agencies were found to have issued permits to non-NSR/PSD sources which, in the auditors' judgment, probably should have been subjected to an ambient impact analysis but were not. EPA identified a total of 16 permits for which this omission occurred.

- Approximately 6 percent of the audited non-NSR/PSD source permits that did not consider ambient effects probably should have, because of the sources' potentially significant air quality impacts.

- In 22 percent of the questionnaires, auditors did not respond to the question asking whether an NAAQS analysis should have been done, but was not. One possible inference is that information in the files was insufficient to determine the need for an NAAQS analysis.

The auditors also examined the NSR/PSD permit files to determine whether and how well the NAAQS analyses were performed for major sources. The findings show that most NSR/PSD sources underwent NAAQS analyses where appropriate; 46 files (75 percent of the files audited) included an NAAQS analysis. The findings also indicate that:

- Auditors identified three NSR/PSD permits for which an NAAQS analysis was completely omitted but, in the auditors' judgment, should have been required.

- Four agencies, each having a PSD file that included an NAAQS analysis, should have required additional analyses, either for omitted pollutants or for more comprehensive review of considered pollutants.

2. Does the agency's ambient impact analysis provide adequate protection against the development of "hot spots"?

Adequate NAAQS protection requires that the reviewing agency give consideration to the interaction of proposed new emissions with emissions from sources already in existence (including sources which may have already received a permit to construct but are not yet operating) and to points of projected maximum ambient concentrations resulting from multi-source interactions, rather than just points of maximum concentrations from the proposed source alone.

Auditors found that many agencies generally provide adequate NAAQS protection. Oftentimes, however, a lack of file documentation prevented the auditors from making a determination. The NSR/PSD source files tended to contain better documentation than did the non-NSR/PSD source files. The audit findings reveal the following:

- Twenty (20) percent of the audited agencies were judged to provide good or acceptable protection of the NAAQS most, if not all, of the time. This figure represents a significant decrease from the 34 percent determined for FY 85.

- Twenty (20) percent of the agencies had files that suffered from insufficient documentation. In these cases, auditors could not determine whether and to what degree source interactions had been considered in the NAAQS analysis.

- Thirteen (13) percent of the agencies were found to be inconsistent in that some analyses adequately considered source interactions, but others did not.

- Twelve (12) percent of the agencies typically omitted significant emissions from other sources in the vicinity of the proposed source.

- Thirty-four (34) percent of the non-NSR/PSD source permits reviewed for NAAQS protection failed to include sufficient documentation to determine the adequacy of the ambient impact analysis. Fifteen (15) percent were judged inadequate in terms of considering multi-source interactions.

- For NSR/PSD permits, 23 percent of the files reviewed for NAAQS protection had insufficient file documentation. Less than 10 percent were judged to have inadequate analyses for full NAAQS protection.

Dispersion Models

1. Does the Agency use adequate models to carry out the ambient impact analysis?

EPA examined the modeling techniques used or accepted by agencies to analyze PSD increment consumption and potential source impact on the NAAQS. The audit results indicate that agencies generally used or required applicants to use the appropriate models and model options. However, in many instances there appeared to be a lack of sufficient documentation regarding the rationale for the use of particular models and methods.

Specifically, the audit findings show that:

- Twenty-three agencies required PSD applicants to perform increment analyses. In 10 of the 23 agencies, auditors found problems with some aspect of the required modeling procedures. These problems included use of an inappropriate model, use of inappropriate model options (such as failure to account for terrain elevation or building downwash), and use of insufficient meteorological data.

- The use of inappropriate models was identified in three NAAQS analyses involving the review of minor sources. The major problem seemed to be that the models used were inappropriate for the existing terrain features.

- Permits found in 22 agencies (almost 70 percent of the agencies where ambient impact analyses were included in the files) did not contain sufficient information to support the use of the models and model options used.

2. Does the Agency perform an independent, internal review of the modeling analyses contained in the permit application?

Apparently, most agencies do not often require non-NSR/PSD source applicants to perform modeling analyses. Seventy (70) percent of the time, the source analyses were performed by the agencies themselves. Most agencies were found to adequately review the applicants' modeling analyses, but inadequate reviews were identified in four agencies. One of these agency reviews involved a non-NSR/PSD source; the other three were PSD sources.

According to the responses provided by auditors, the applicants were required to submit a modeling analysis for only 18 of the files that were examined. Therefore, in cases where modeling analyses were submitted by the applicant, the analyses were not adequately checked by the responsible agency approximately 20 percent of the time.

4.9 EMISSION OFFSET REQUIREMENTS

When a major new or modified source is allowed to construct in a designated nonattainment area, emission reductions are generally required to offset the new emissions. These emission reductions or offsets must meet specific criteria set forth under Part D of the Clean Air Act in order for the offsets to be creditable. Auditors examined selected files involving sources subject to the emission offset requirements to determine whether they met such criteria.

EPA examined, in 11 agencies, 17 major source permit files involving construction in nonattainment areas. Of these 17 files, 3 permits were issued under programs which excluded the applicants from having to obtain emission offsets. The remaining files involved sources that should have obtained offsets; however, three sources apparently did not obtain offsets and the enforceability of an additional case was called into question.

With regard to the examples where offsets were not obtained, the audit results indicated the following:

- One agency should have required emission offsets for two different audited sources, but apparently failed to do so. The offset required for each of the facilities concerned the same nonattainment pollutant. There was insufficient documentation in each of the files for the auditors to determine why this issue was not addressed.

- The file review at one agency identified a source modification that resulted in a significant increase in VOCs, as well as resultant VOC emissions qualifying the facility as a major source in an ozone nonattainment area. The offset requirements were not clearly defined and the auditor had to review the entire set of documents to determine where adjustments were made. Apparently, no analysis was done for ozone. The application and engineering analysis stated that the operation of existing equipment would be limited to 50 percent of annual production. This limitation was not stated in the permit.

The Federal enforceability of offsets issued in one case was questioned by the auditor. The permit to construct was deemed Federally enforceable; however, the permit to operate did not contain specific emission limits for offsetting units. Apparently, certain allowable limits were lowered based on good housekeeping and engineering practices rather than pollution control equipment.

Generally, agencies required offsets to occur on or before the time of new source operation, and to be expressed in the same manner as for the demonstration of RFP (i.e., actual vs. allowable emissions). EPA auditors had difficulty determining compliance with other specific criteria with which the offsets must comply, such as consideration of minor source growth and use of credit from shutdowns or production curtailment. Agencies often did not provide documentation ensuring that these criteria had been met, even though they actually might have been.

4.10 PERMIT SPECIFICITY AND CLARITY

This final section of the new source review audit provides the results of EPA's examination of information contained in the permits issued to new and modified sources. Specifically, auditors were asked to examine how, and whether, permit conditions defining limitations applicable to the approved source or modifications are being established. Such limitations typically become the enforceable measures by which a source's construction and operation is regulated, and the means by which ongoing compliance is determined.

1. Does the agency adequately state or reference allowable emission rates in each permit?

Ten (10) agencies did not routinely state or reference each source's allowable emissions in the PSD/NSR permits, and 25 agencies did not always do so for non-PSD/NSR permits. The omission appeared to be a common occurrence--at least for non-NSR/PSD permits; at 13 agencies this omission occurred in over 35 percent of the permits.

An analysis of the individual permit file questionnaires shows that approximately 34 percent of the non-PSD/NSR construction permits in the audit data base did not specify the allowable limits. This finding must be qualified, however, because of the ambiguity of the instructions provided to the auditors by the questionnaire. Those instructions easily could have been misinterpreted by the auditors as asking them to provide only the number of emission limits actually specified in the permits, and not cases where a reference was made to a regulation containing the required limit. It is not clear how many of the responses took referenced limits into account (as was intended), but it is known that some did not.

The same qualification must be given for the results pertaining to NSR/PSD permits as well, although the ambiguity did not appear to have much effect on the findings. There was one permit for which an auditor specifically stated that no limits were found, but auditors did not respond to the question in three cases. There were also 10 permits for which the questionnaire was filled out incorrectly, and 4 others that listed inappropriate limits. These considerations will be taken into account during revision of the questionnaire for use in the next air audit.

Where limits were specified in the permits, auditors were asked to evaluate them in terms of their clarity, consistency with measurement techniques, and Federal enforceability. In most cases, the permits contained more than one emission limit. Where at least one of the limits was determined to be inadequate with respect to any of the variables considered, that file was rated inadequate as a whole. The percentages, as shown below, are based on the total number of permits that contained emission limits.

	PSD/NSR Permits			Non-PSD/NSR Permits		
	YES (%)	NO (%)	CBD (%)	YES (%)	NO (%)	CBD (%)
a. Clear and precise averaging periods	87	6	7	78	12	4
b. Emission rates consistent with acceptable measurement techniques	83	1	16	88	7	1
c. Federally enforceable	83	7	10	87	1	2

2. Does the agency identify all emission units and their allowable emissions in the permits?

Auditors reported that the PSD/NSR permits from at least 13 agencies did not routinely identify each emission unit along with its allowable emission limit. For non-PSD/NSR permits, this problem was evident at 31 agencies. Overall, the responses indicated that over half of the agencies "do not" or "generally do not" adequately address each emission unit in their issued permits. In one of these agencies, it was noted that the emission units and the emission rates applicable to those units were identified primarily to avoid PSD/NSR review.

EPA found that 17 (28 percent) of the PSD/NSR permits and 142 (52 percent) of the non-PSD/NSR permits did not address each unit and its allowable emissions. It would appear that in some cases emissions were "bubbled" under a single or composite emission limitation. This would make it difficult to enforce the limit with respect to the emissions originating at any particular unit. Agencies are advised to avoid any such practice because of the questionable enforceability of such composite limits.

3. Are compliance test methods stated or referenced in the terms and conditions of the permits?

Eighteen agencies reportedly either did not at all or did not consistently state or reference compliance test methods in the PSD and Part D permits. For non-PSD/NSR permits, similar results were found for 29 agencies. Where the practice is not followed consistently, it is not clear what criteria, if any, agencies use to determine whether such information is to be included in the permit. Compliance test methods are commonly defined in the State or local agencies' rules and regulations, and many agencies have indicated in past audits that specific mention of the test methods in each permit is not required to enable the agency to use them for compliance determination purposes.

Of the 180 non-NSR/PSD permits that specified emission limits, 52 percent stated or referenced all or some compliance test methods; 31 percent did not. For the remainder, it could not be determined from the auditors' responses how compliance test methods were addressed.

Agencies appeared no more consistent in stating or referencing the compliance test methods in PSD/NSR permits. Fifty-four (54) percent of the evaluated permits stated or referenced compliance test requirements for some pollutants; only 11 percent did not. Again, auditors did not respond to the question in a significant number of permit reviews (16 percent). Based on the number of pollutants, 59 percent of the limits had adequate test requirements, 27 percent did not, and the adequacy of 14 percent could not be determined.

CHAPTER 5

COMPLIANCE ASSURANCE

5.1 EXECUTIVE SUMMARY

As was the case in the FY 85 National Air Audit System (NAAS) effort, many States and locals showed one or more strong points characteristic of a successful air compliance program, such as high source compliance rates supported by high inspection frequency rates, performance of all required New Source Performance Standard (NSPS) source tests, expeditious resolution of violations, and few long-term violators. These activities were adequately reflected and validated by the national Compliance Data System (CDS). Other States had source files that were, for the most part, well organized, up-to-date, and complete, reflecting a reasonable profile of each source.

A State-by-State analysis of inspection rates shows that inspections of Class A1* State implementation plan (SIP) sources generally decreased over those reported in the FY 85 audit (from 89 to 84 percent), and five States were still unacceptably low, with inspection rates of less than 60 percent. Compliance rates for Class A1 SIP sources remained roughly the same as FY 85 (91 to 92 percent). The NSPS national figures for both inspection and compliance rates rose (88 to 90 percent and 90 to 93 percent, respectively), even though some individual State rates declined. The NSPS inspection rates for nine States are unacceptably low, with figures of less than 60 percent. National Emission Standards for Hazardous Air Pollutants (NESHAP) inspection rates showed an increase (from 67 to 96 percent), while compliance rates fell slightly (from 93 to 90 percent). Twelve States have NESHAP inspection rates at or below 60 percent.

The compliance audits also revealed that several State and local agencies, to a varying extent, still have weaknesses in three areas vital to a strong and effective compliance program. First, source files maintained by some State and local agencies do not contain verifiable information reflecting a reasonable profile of each source. In fact, the percentage of those reviewed that reflected a reasonable profile of the sources decreased from 72 percent in FY 85 to 65 percent in FY 1986-87. Even so, some audit reports cited improvement since the FY 85 audits in the condition of State files. Second, some inspection reports are still of poor quality (no mention of operating or emission parameters, or pollutants emitted), and this is a significant concern. For some agencies, however, there has been noticeable improvement in the quality of inspection reports since FY 85. Third, some of the reviewed agencies' enforcement efforts are not always effective in reducing the number of long-term violators by expeditiously returning documented violators to compliance, although overall there was a slight increase in the percentage of audit reports that indicated sources were being expeditiously returned to compliance (from 74 to 77 percent).

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* Class A1 includes sources with actual or potential controlled emissions greater than or equal to 100 tons per year.

Thus, while there have been improvements in all of these critical areas, some State and local agencies need to heighten efforts in the aforementioned three areas to continue strengthening their compliance programs.

5.2 INTRODUCTION

As in FY 1985, the compliance assurance element of the FY 1986-87 NAAS was designed to examine State and local programs that are responsible for the compliance of sources subject to requirements of SIPs and, where delegated, NSPS (Section 111) and NESHAP (Section 112). Of the several hundred thousand regulated stationary sources in the nation, there are approximately 30,000 sources in these categories for which EPA and State/local agencies share a concern about compliance status and associated enforcement activities. Compliance activities focusing on these sources formed the primary basis on which each audit was conducted.

There are three major parts of the compliance assurance audit. The first is a pre-visit assessment of the State or local agency performed by examining source data reported to EPA by the agency. For FY 1986-87, this once again included an assessment of how the "timely and appropriate" guidance was working. The other two parts of the audit consisted of doing an on-site review of State source files and conducting overview inspections.

In accordance with the NAAS guidance, the EPA Regional Offices were to conduct the pre-visit assessment by obtaining CDS retrievals for the most recent fiscal year on inspection frequency, compliance rates, and enforcement activity. The Regions were than to analyze the CDS data for source compliance status, progress in meeting inspection commitments, identification of long-term violators and associated compliance activity, adherence to "timely and appropriate" guidance, identification of long-term compliers and associated surveillance activity, and identification of operating NSPS sources without the required 180-day performance test. Finally, based on this CDS analysis, the Regions were to prepare a summary of each compliance program and send it to the State or local agency before the visit. The analysis could have taken the form of a questionnaire for the agency or could have been a statement of findings to be discussed for completeness and accuracy during the visit. The pre-visit assessment was also designed to help in identifying the source files to be reviewed during the on-site visit.

The next major part of each audit was the on-site visit. The visit centered on a discussion of the findings in the pre-visit assessment and on review of 15 to 20 source files. The files to be reviewed consisted of a mixture of SIP, NSPS, and NESHAP sources. A file review checklist was developed to ensure consistency in how the file reviews were implemented. The goals were to see if the files contained a reasonable profile of the source, written documentation to support the compliance status reported to EPA, and documentation to show that violators are expeditiously returned to compliance. The State and local audit reports were envisioned to include a discussion of both the pre-visit assessment and the status of the files.

The final component of the compliance audit was to be a program of overview inspections conducted by EPA of 2 to 3 percent of the sources in the CDS inventory (Class A SIP, NSPS, and NESHAP). The purpose was to verify the compliance status of a source as reported to EPA, as well as review State or local agency inspection practices to see if there were areas where EPA could increase performance through technical assistance to the State and local agencies.

This national summary report covers 60 State and local audits. The 10 questions in Sections 5.4, 5.5, and 5.6 which follow were condensed from the FY 1986-87 audit questions. These questions represent the key elements of the compliance portion of the audit, and provide a uniform basis to do a national assessment of the 60 compliance audit reports.

5.3 MAJOR FINDINGS AND CONCLUSIONS

As was the case in the FY 85 NAAS effort, many States and locals showed one or more strong points characteristic of a successful air compliance program, such as high source compliance rates supported by high inspection frequency rates, performance of all required NSPS source tests, expeditious resolution of violations, and few long-term violators. These activities were adequately reflected and validated by the national CDS. Other States had source files that were, for the most part, well organized, up-to-date, and complete, reflecting a reasonable profile of each source.

A State-by-State analysis of surveillance statistics shows that inspection rates for Class A1 SIP sources generally decreased over those reported in the FY 85 audit, and five states are still unacceptably low, with inspection rates of less than 60 percent. Compliance rates for Class A1 SIP sources remained roughly the same as in FY 85. The NSPS national figures for both inspection and compliance rates rose, even though some individual State rates declined. The NSPS inspection rates for nine States are still unacceptably low, with figures of less than 60 percent. NESHAP inspection rates showed an increase, while compliance rates fell slightly. Twelve states have NESHAP inspection rates below 60 percent.

The compliance audits also revealed that several State and local agencies, to a varying extent, still have weaknesses in three areas vital to a strong and effective compliance program. First, source files maintained by some State and local agencies do not contain verifiable information reflecting a reasonable profile of each source. In fact, the percentage of those reviewed that reflected a reasonable profile of the sources decreased from 72 percent in FY 85 to 68 percent in FY 1986-87. However, several audit reports mentioned some improvement since FY 85 audits in the condition of State files. Second, some inspection reports are still of poor quality (no mention of operating or emission parameters, or pollutants emitted), and this is a significant concern. For some agencies, there was, however, a noticeable improvement in the quality of inspection reports since the last review. Third, some of the reviewed agencies' enforcement efforts are not always effective in reducing the number of long-term violators* by expeditiously returning documented violators to compliance, although there was a slight increase in the percentage of reports that indicated sources were being expeditiously returned to compliance.

Thus, while there are improvements in all of these critical areas, some State and local agencies need to heighten efforts in the aforementioned three areas to continue strengthening their compliance programs.

The remainder of this report addresses these findings in more detail. It is organized by the three parts of the audit: pre-visit assessment, file review, and overview inspections. The aforementioned 10 questions, which represent the key elements of this compliance audit, are discussed in each appropriate part.

5.4 PERIODIC REVIEW AND ASSESSMENT OF SOURCE DATA

To assess the adequacy of State and local compliance programs, the EPA Regional Offices continuously review source compliance status and inspection information submitted by the audited agencies and reflected in CDS for the SIP, NSPS, and NESHAP programs.

As shown in the four pie charts in Figures 5.1 through 5.4, the national compliance picture is very respectable. Compliance rates have improved since the FY 85 audits for Class A1 SIP and NSPS sources, and have declined slightly for NESHAP sources. The bar charts in Figures 5.5 through 5.8 depict, for each aspect of the air program, the inspection range, compliance range, and range of long-term violators for all State and local agencies audited. As shown, inspection rates for Class A SIP sources range from 28 to 97 percent, while NSPS and NESHAP sources range from zero to 100 percent. Median figures for these three programs are between 73 and 96 percent (compared to 67 percent and 88 percent in the FY 85 report). Compliance rates for Class A SIP, NSPS, and NESHAP sources range from a low of 40 percent in one jurisdiction to a high of 100 percent in another, with median figures between 95 and 99 percent. The number of long-term violators (defined for this audit as two consecutive quarters or more) in each jurisdiction was largest for Class A SIP sources, ranging from a low of zero in some agencies to a high of 88 in another, with a median figure of 8 sources per jurisdiction.

The following question is the first of 10 developed as a guide for summarizing the findings from each of the audit reports.

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* "Long-term violators" means sources in violation for two continuous quarters or more.

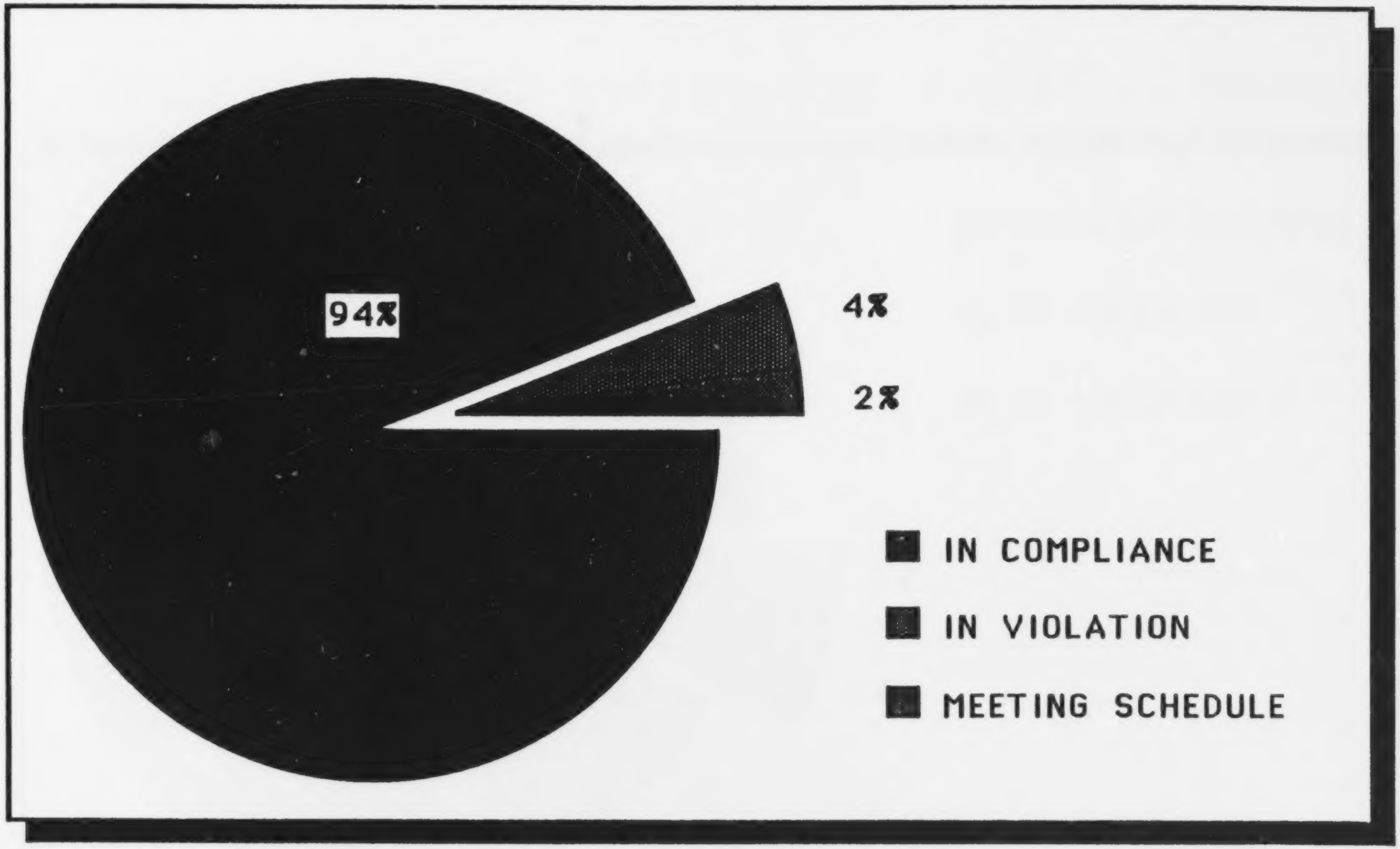

FIGURE 5.1 COMPLIANCE BREAKOUT OF CLASS A SIP SOURCES

Data source: FY 87 CDS

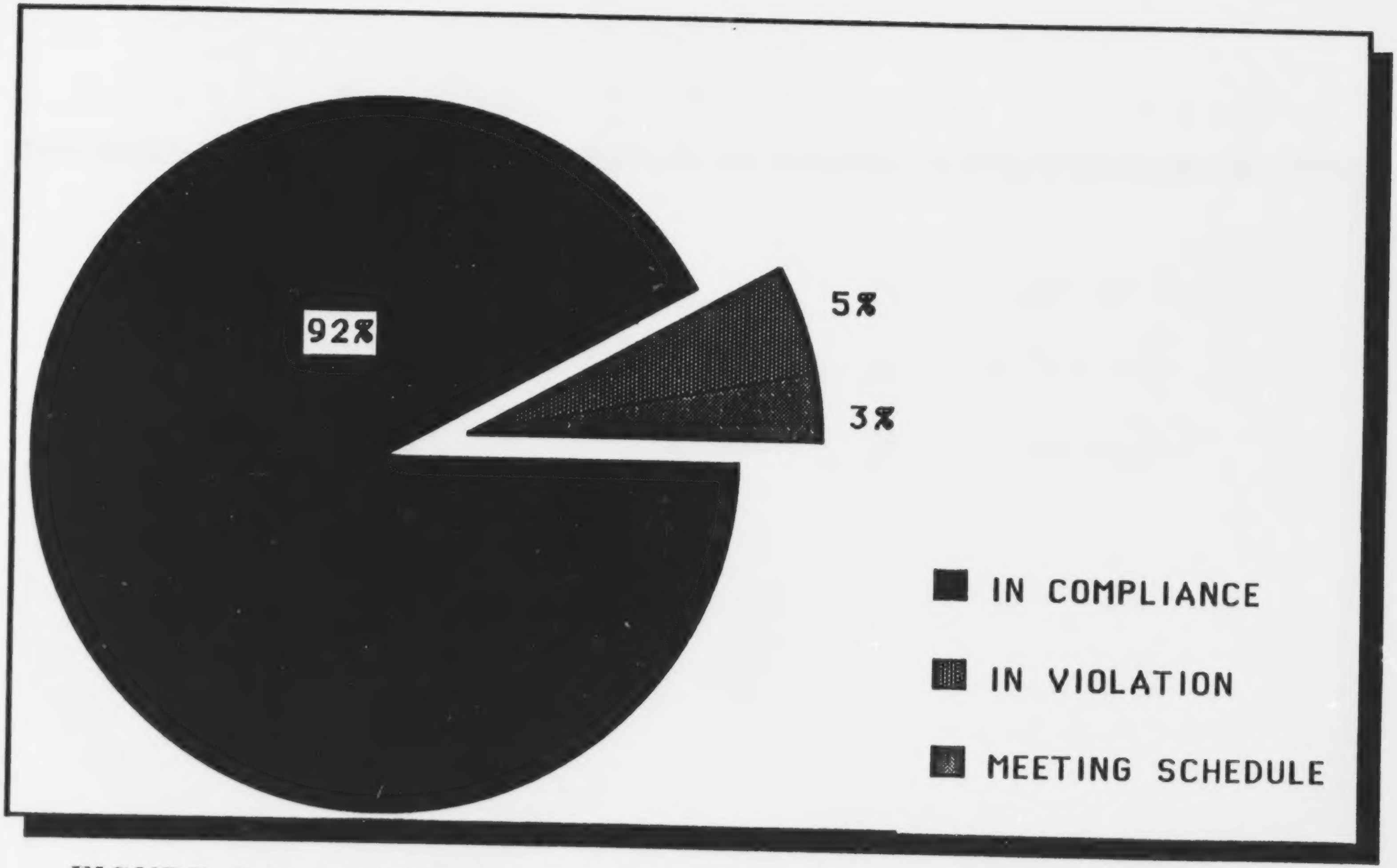

FIGURE 5.2 COMPLIANCE BREAKOUT OF CLASS A1 SIP SOURCES

Data Source: FY 87 CDS

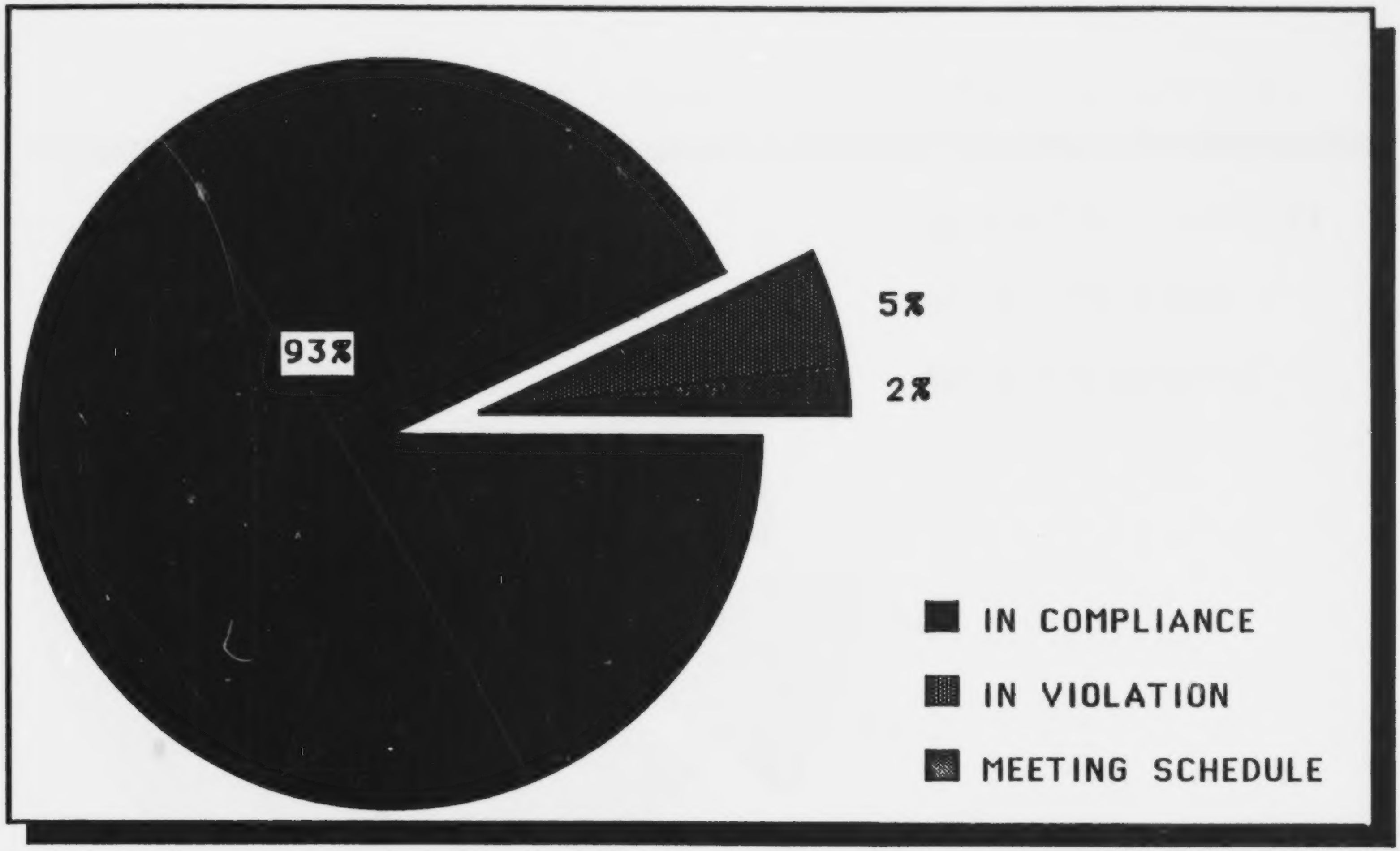

FIGURE 5.3 COMPLIANCE BREAKOUT OF NSPS SOURCES

Data Source: FY 87 CDS

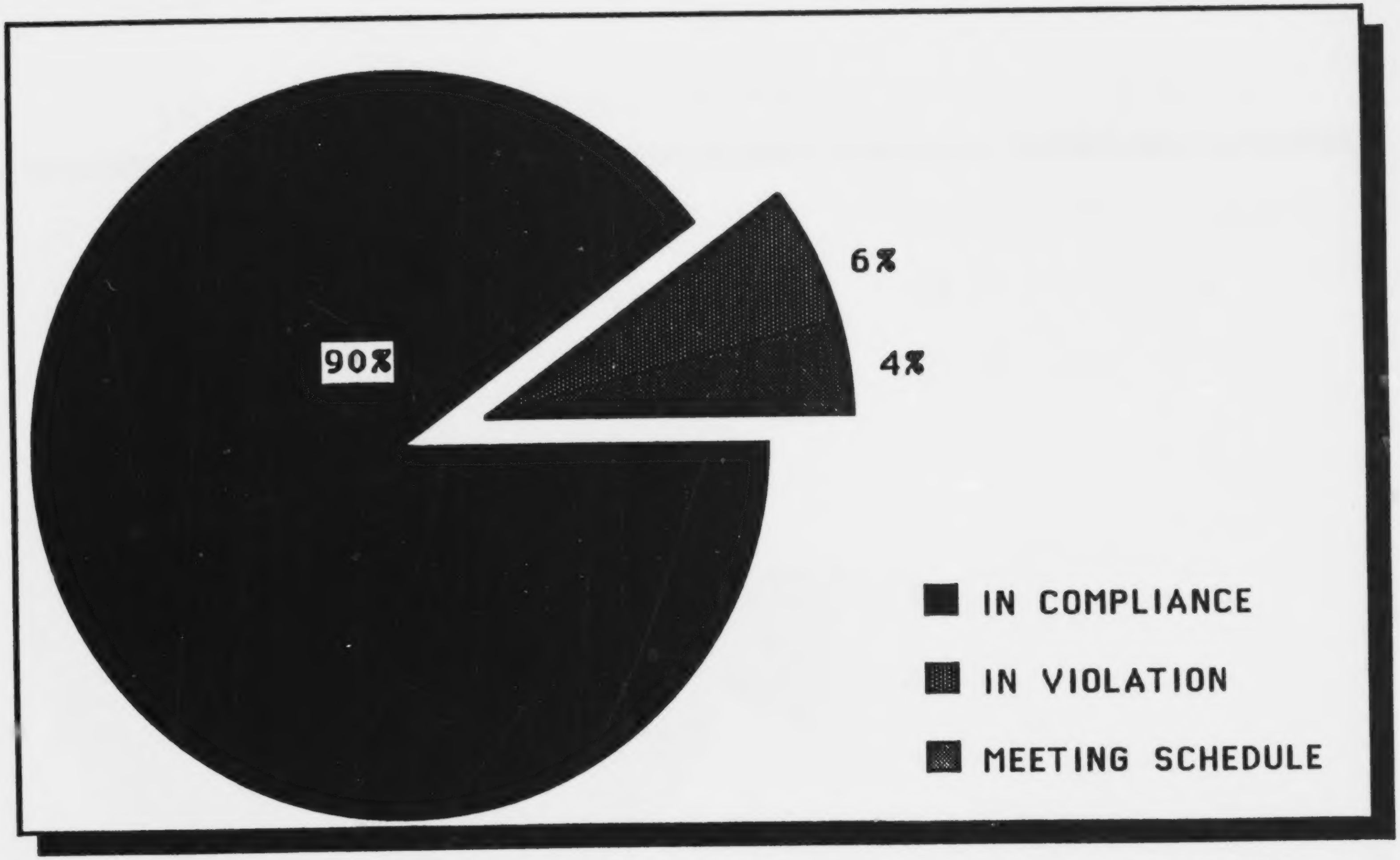

FIGURE 5.4 COMPLIANCE BREAKOUT OF NESHAPS SOURCES

Data Source: FY 87 CDS

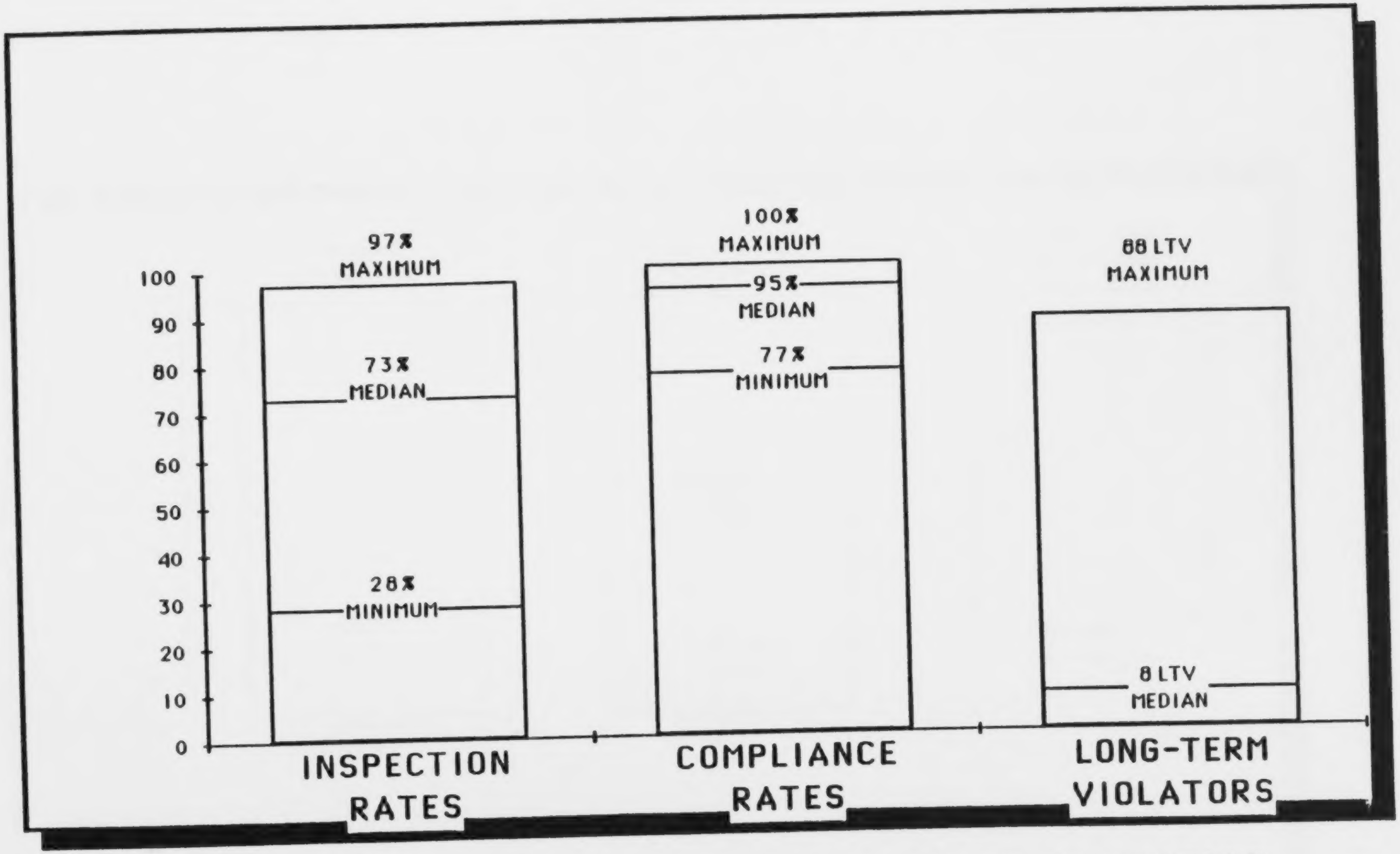

FIGURE 5.5 CLASS A SIP PERFORMANCE STATISTICS

Data Source: FY 87 CDS

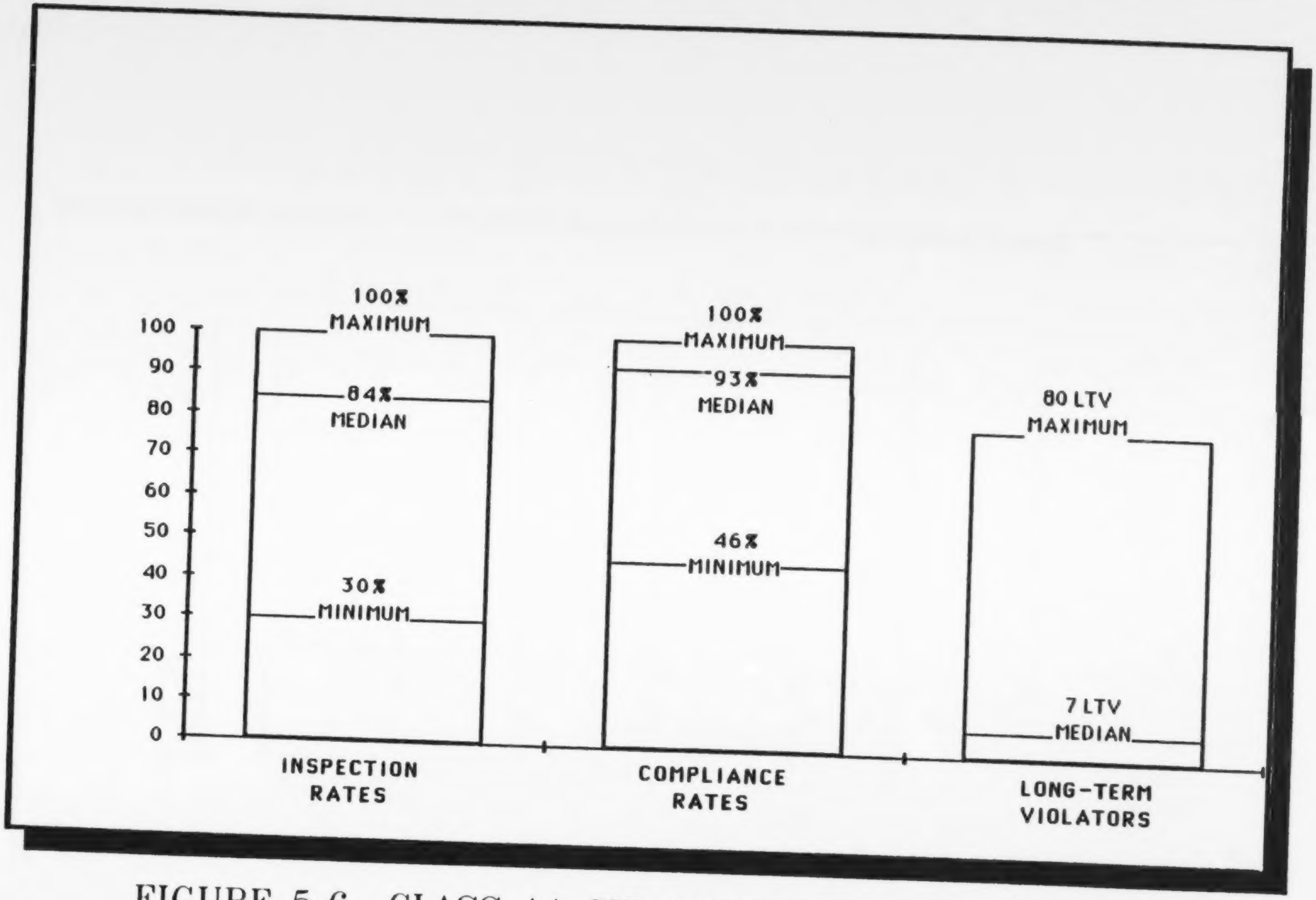

FIGURE 5.6 CLASS A1 SIP PERFORMANCE STATISTICS

Data Source: FY 87 CDS

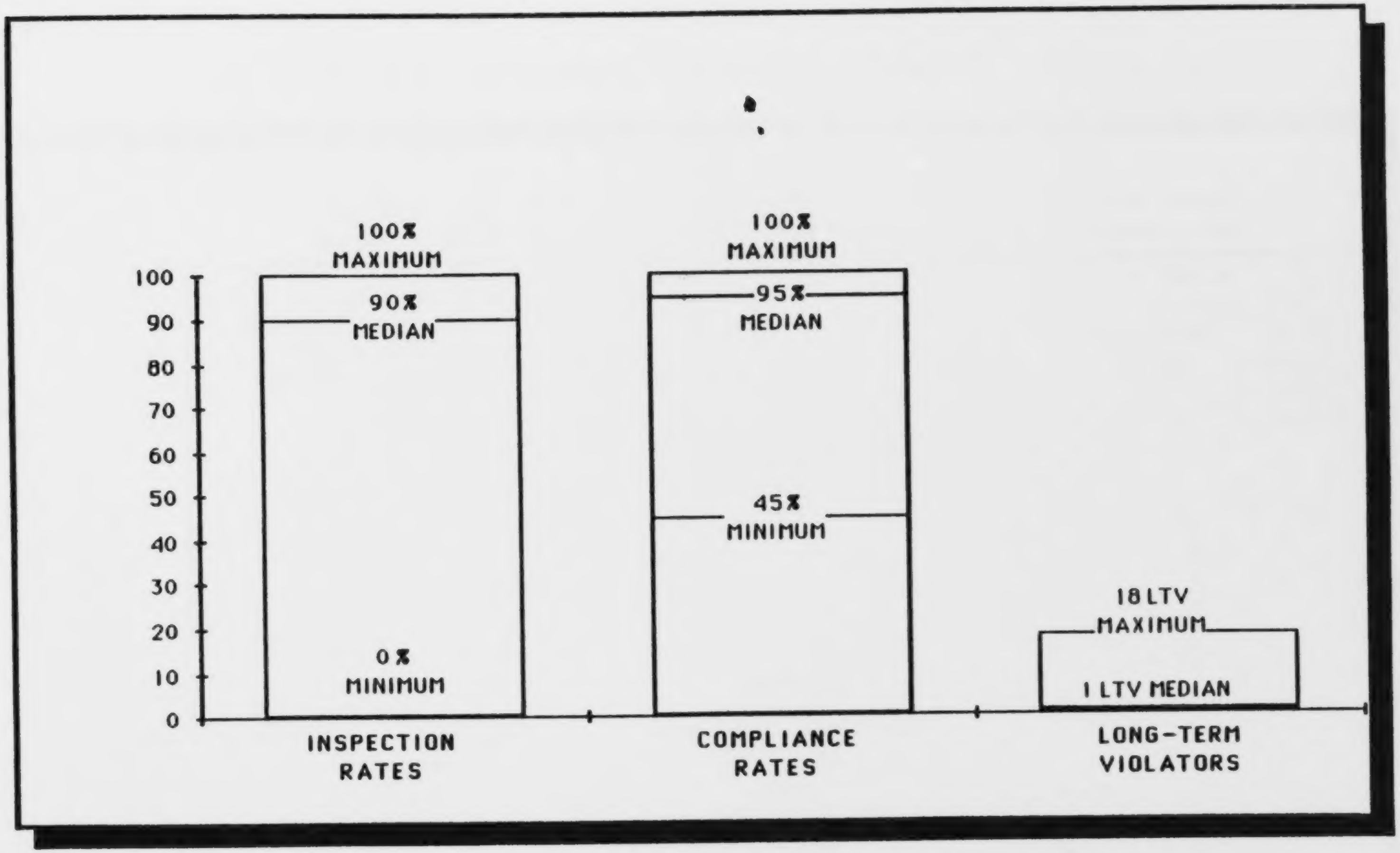

FIGURE 5.7 NSPS PERFORMANCE STATISTICS

Data Source: FY 87 CDS

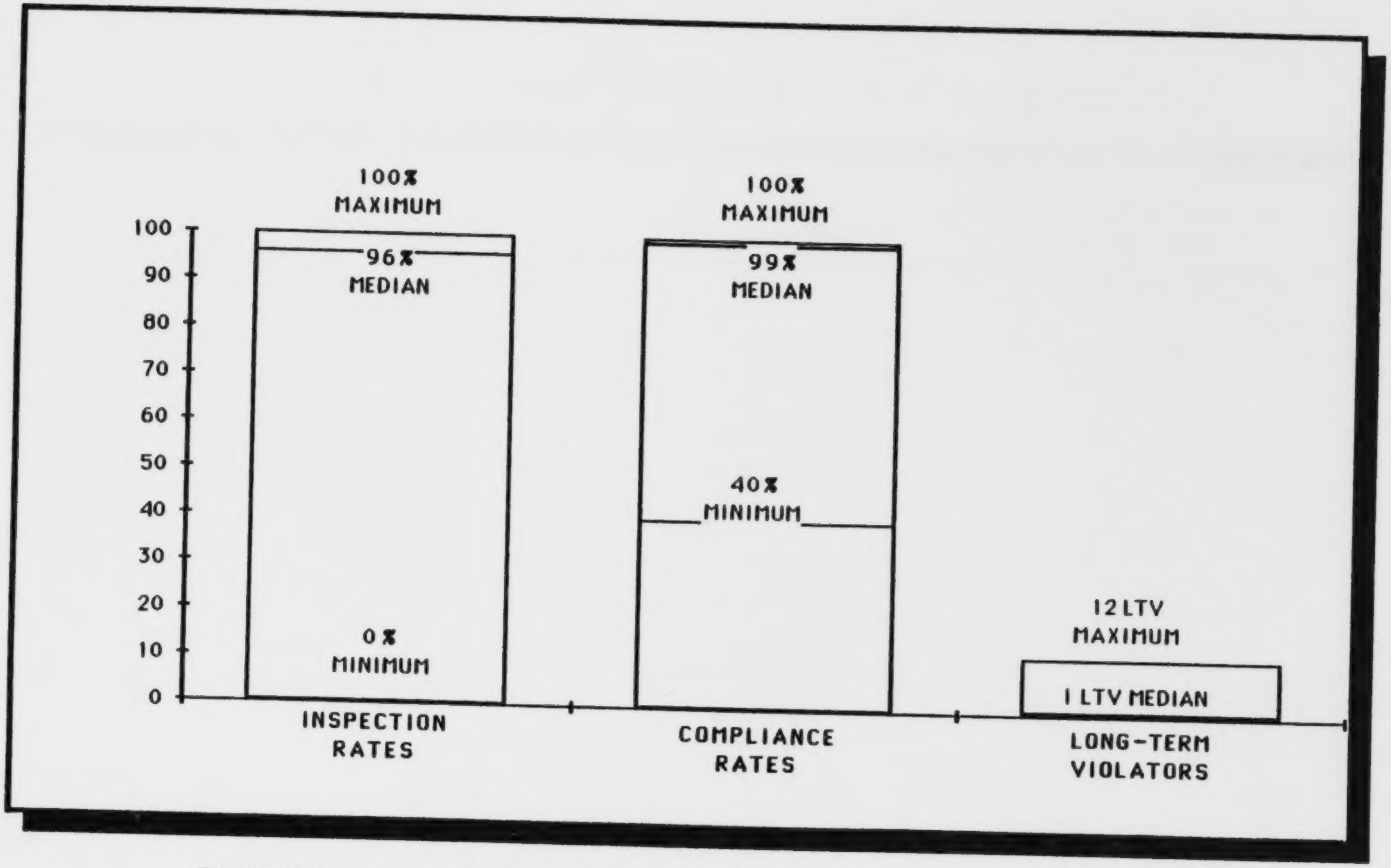

FIGURE 5.8 NESHAPS PERFORMANCE STATISTICS

Data Source: FY 87 CDS

(1) Based on the findings of the pre-visit program analysis, what was the Region's overall assessment of the condition of the air compliance program?

A review of the 60 audit reports shows that some form of pre-visit assessment was done by the Regions for all but three States and one local program. Thirty-four of these reports contained an overall statement about the particular compliance program based on the CDS analysis:

- Six air compliance programs were considered very good.
- Twenty-seven air compliance programs were considered adequate (meeting most Clean Air Act requirements).
- One air compliance program was termed deficient.

The remaining 22 audit reports (where a pre-visit assessment was done) made no definitive statement on the air compliance program based on the CDS assessment, but positive comments were made in 10 of these reports, such as "inspection rates are very good" and "compliance rates are good to excellent." It was not possible to determine anything of substance relative to the pre-visit assessment from the other 12 reports.

Careful study of the audit reports for the six agencies with "very good" air compliance programs shows several elements contributing to the success of each compliance program. In general, these agencies:

- routinely complete nearly all the required inspections for SIP, NSPS, and NESHAP sources where delegated;
- have compliance levels for Class A SIP, NSPS, and NESHAP sources consistently above 90 percent, with recent inspections to support this level;
- address, in a timely manner (and according to "timely and appropriate" guidelines), sources found to be in violation of applicable emission limits or permitting requirements, resulting in few, if any, long-term violators (greater than two consecutive quarters).

It seems likely that other States have compliance programs as good as these six, but this was not readily discernible from the description of the programs in the audit reports.

(2) What is the Region's overall assessment of how the "timely and appropriate" guidance is working in the State or local agency?

Forty-two audit reports indicated that the guidance is being followed and the program is working well, while nine reports stated that the guidance was not being followed (meaning few, if any, violations were resolved according to the guidelines). Of the remaining reports, four had no conclusions on the "timely and appropriate" guidance because there were no violators subject to the guidance. The other five reports did not discuss the guidance in any detail.

To summarize the CDS based pre-visit assessment, 33 (55 percent) of the 60 State and local compliance programs were found by the Regions to be either adequate or very good, and only one program was judged deficient based on that assessment. It was not possible to assign an overall description of the programs from the other 26 (43 percent) reports but, as noted earlier, 10 of these had positive comments about the air compliance program. This initial effort identified many good programs and pointed out areas where the State and local agencies and EPA should continue to work together to improve compliance programs.

5.5 FILE REVIEW

(3) Did the source files reflect a reasonable profile of the sources?

All but one of the 60 audit reports contained file review information. Forty-one (60 percent) of these indicated that the files reviewed reflected a reasonable profile of the source, which means they contained the following information: source compliance status based on recent inspection or source test, an identification of all air program regulations the source is subject to, and, within the inspection reports, operating parameters, point sources, and pollutants emitted by the facility. Some common reasons cited in the 18 (30 percent) audit reports where the files were considered deficient were: inability to determine source compliance status from file contents, no indication of which air program regulations the source was subject to (SIP, NSPS, NESHAP), and missing or poor quality inspection reports (no mention of operating or emission parameters, point sources, or pollutants emitted by facility). The remaining report did not contain a conclusive statement on this question.

(4) Did the files contain adequate written documentation to support the CDS compliance status?

Thirty (50 percent) of the 60 audit reports indicated that reviewed files contained some written documentation of compliance status to support CDS. This represents a drop of 7 percent from the FY 85 documentation rate of 57 percent. Twenty-seven (45 percent) of the audit reports either cited a lack of any compliance information in the files or showed information in the files that conflicted with CDS. The other three reports did not contain sufficient information to answer this question.

(5) Are violations documented and pursued by agencies to return a source to compliance expeditiously?

Thirty-seven (62 percent) of the 60 audit reports indicated that violations are documented and pursued to return a source to compliance expeditiously. Fourteen reports (23 percent) indicated that some sources were not being expeditiously returned to compliance, in some cases leading to a number of long-term violators (greater than 180 days) or untimely, protracted enforcement actions. Nine reports (15 percent) lacked a definitive response to this question.

5.6 OVERVIEW INSPECTIONS

(6) How many inspections were performed?

The number of EPA overview inspections performed ranged from a low of one in 1 State to a high of 54 in another. The total number of inspections for all 45 reports was 772.

(7) How were sources selected by the Region for the overview inspections?

By far, the most common criteria used by the Regions to select sources subject to overview inspections were some combination of the type of program (to ensure a representative sample of SIP, NSPS, and NESHAP sources), location (primary attention to impact on nonattainment areas as well as geographic spread), source compliance history, and pollutants. Most of the differences between the Regions' selection approaches were found in the amount of relative emphasis placed on each criterion.

(8) What did each inspection consist of in terms of procedures followed and involvement of State personnel?

Almost all of the overview inspections performed were a joint effort between EPA and the States. Most began with a review of State source files and progressed to an on-site visit to the source, with both EPA and State inspectors conducting separate evaluations of source compliance status, after which separate reports were written and compared. A summary of the 45 audit reports with answers to this question appears below:

	Reports	Inspections
Joint Inspections - State Lead	13	223
Joint Inspections - EPA Lead	21	236
Joint Inspections - Dual Lead	8	149
Independent EPA Inspections	3	36
Total	45	644

The other 128 inspections were from audit reports that did not specify what each inspection consisted of.

(9) What was the purpose of the overview inspections (that is, to independently verify State reported compliance, to observe State inspection practices, or some combination of these)?

Twenty-one (35 percent) of the 60 reports stated that the purpose was a combination of independently verifying State compliance and observing/critiquing State inspection procedures (including State inspector qualifications). Of the other 26 reports, 24 mentioned simple verification of compliance status as the primary inspection goal, and 2 cited observation of State practices as the goal. The remaining 13 reports had no information on this subject.

(10) What were the overall results of the overview inspection effort, including recommendations for resolution of any problems discovered during the effort?

Forty-three (43) of the 44 responses to this question showed both the expertise of State inspectors and State reported compliance status to be adequate, which means the State inspectors were experienced enough to conduct a thorough inspection and determine the compliance status of a source. Only one report indicated that overview inspection results did not agree with the compliance status in the State files or CDS.

Regarding recommendations, four reports suggested that more training for State inspectors would improve the quality of inspections and result in more accurate inspection data being reported to EPA.

CHAPTER 6

AIR MONITORING

6.1 EXECUTIVE SUMMARY

The 1986-87 National Air Audit System included audits of air monitoring in 75 agencies. Four principal areas within the agencies' programs were evaluated. These areas were network design and siting, resources and facilities, data and data management, and quality assurance/quality control. The principal conclusions from the audits are discussed below.

State and local agencies have continued to operate and maintain successfully their State and local air monitoring station (SLAMS) and national air monitoring station (NAMS) networks. About 99 percent of the 3,500 monitors operated by the audited agencies are meeting the design and siting regulations for ambient air monitoring networks.

The audit reports did disclose that 85 percent of the audited agencies reported a need for either new or replacement monitoring or laboratory equipment, which would cost $2.7 million. Of this total, $1.7 million was needed for air monitoring equipment and $1 million for laboratory equipment. A more comprehensive State/local agency equipment survey conducted in 1987 estimates that $4 million is needed for monitors and $3 million for support equipment. This survey is more recent and should be used for planning purposes, rather than estimates from the audit program.

Similarly to previous audits, the FY 1986-87 audit indicated that timeliness of data submittal is still a problem for many agencies, particularly submissions of lead (Pb) data, which were late in 29 percent of the agencies audited. Concerning data completeness, the overall percentage was good, with a low of 78 percent for nitrogen dioxide (NO_2) and a high of 94 percent for lead. The data management section of the audit revealed that 20 percent of the agencies failed to submit at least one of the essential elements of the annual SLAMS report, and corrective actions are being taken with regard to this problem.

The quality assurance/quality control portions of the audit reports continue to demonstrate good overall performance. Three agencies needed major changes to their quality assurance plans, and 32 had minor revisions pending. Concerning the achievement of quality assurance goals, for data precision (±15% for all pollutants) and accuracy (±15% for TSP, ±20% for other pollutants), the only significant problem is with precision for Pb, for which only 55 percent of the reporting organizations achieved the goal. This is believed to be related to the analysis procedure.

6.2 INTRODUCTION

Ambient air monitoring for State implementation plan (SIP) purposes is required by Section 110 of the Clean Air Act. Furthermore, Section 319 of the Act requires the development and application of uniform air quality monitoring criteria and methodology, the reporting of a uniform air quality index in major urban areas, and the establishment of a national air monitoring system that uses uniform monitoring criteria. To comply with these requirements, the Agency promulgated ambient air monitoring regulations (40 CFR 58) in 1979, with further revisions in subsequent years. The most recent changes were for particulate matter of aerodynamic diameter equal to or less than a nominal 10 micrometers (PM_{10}). Included in the CFR Part 58 regulations are requirements that State and local air monitoring programs be audited. These provisions have served as the basis for the national air monitoring audits which began in 1984. The findings and recommendations of the 1984 audits led to several changes in the questionnaire for the 1985 air monitoring audits. The 1985 guidance did require, for national consistency, that all EPA Regional Offices use at least the short form questionnaire, the corrective action implementation request (CAIR), and the system audit reporting format. Use of the long form questionnaire was left to the discretion of the Regional Quality Assurance Coordinator, with the concurrence of the State or local agency involved. Following the FY 1985 audit program, the National Air Audit System changed from annual to biannual cycles, to conserve resources and to allow State and local agencies a reasonable period to implement changes indicated by the prior audit. The team performing the 1986-87 audits consisted of EPA Regional Office personnel and, in some cases, Headquarters representatives. The audits included interviews, site inspections, and completion of the short or long form air monitoring questionnaires.

6.3 MAJOR FINDINGS AND CONCLUSIONS

The air monitoring programs of 75 agencies (46 States, 26 locals, the District of Columbia, and 2 territories) were audited during the FY 1986-87 cycle. However, we have received only the text portion of the audits for four State and four local agencies. Since the audit questionnaires for these eight agencies are not included, the tabulations of this report are based on information from 67 agencies. The audit results represent all EPA Regions except Region IX, which did not conduct any State or local air monitoring system audits during the cycle. The audit results continue to demonstrate that, overall, State and local agencies are successfully operating and maintaining their respective SLAMS/NAMS networks. About 99 percent of the 3,500 monitors operated by the audited agencies are meeting the CFR Part 58 monitoring requirements.

Concerning the audit findings on resources and facilities, most agencies indicated that they had adequate space and personnel. However, 73 percent of the agencies did have air monitoring equipment needs, including pollutant monitors, calibration systems, data processing equipment, and meteorological equipment. The estimated cost to procure the needed equipment is approximately $1.7 million. Also, 20 agencies reported a need for major laboratory equipment, the cost of which is about $1 million.

Timely data submission remains a problem for many agencies. As reported in the 1985 audit results, data submittals for the pollutant lead (Pb) continue to be the most deficient. During the audit cycle, approximately 29 percent of the agencies were late with their Pb data submittals. The percentages of late submittals for all pollutants range from 29 for lead to 10 for TSP. Performance in meeting the National Aerometric Data Bank (NADB) 75 percent data completeness criterion showed a range of 16 percent, the lowest being 78 percent for NO_2 and the highest being 94 percent for lead. One of the larger problem areas found in data management was the requirement for submitting the annual SLAMS report. The audit showed that, of the 45 audited agencies required to submit an annual SLAMS report, 9 agencies (20 percent) were deficient in one or two of the four elements required in the annual report. Efforts to resolve this problem administratively are continuing, with a slight improvement occurring between the FY 1985 and FY 1986-87 audits.

The quality assurance (QA) aspects of the audit reports indicated that 64 of the 67 agencies had QA plans that were, in general, acceptable. However, three agencies need to revise their plans substantially, and 32 had minor revisions to their QA plans pending. Sixty-four of the 67 agencies were also participants in the National Performance Audit Program, an excellent rate of involvement. The last phase of the quality assurance program evaluation was an assessment of agencies' achievement of the precision and accuracy goals. The lowest achievement rate for the precision goals (based on four consecutive quarters of data between October 1984 and March 1987) was for Pb, for which only 55 percent of the organizations met the goal. Based on data submitted to the Environmental Monitoring Systems Laboratory (EMSL) in 1986, 66 percent of the reporting organizations met the Pb precision goal. This difference of 11 percent is thought to be principally because of the different time periods used. Goal achievement for Pb precision was noticeably lower than for other pollutants, in both the audit results and the 1986 EMSL data. The lowest percentage of accuracy goals met was 65 percent, which was for NO_2. However, the 1986 NO_2 accuracy achievement level based on the annual data submitted to EMSL was considerably higher, at 94 percent. There is no apparent reason for this large difference, since the two data sets for other pollutants compare fairly well. The lower values for both NO_2 and Pb precision are believed to be related to the complexity of the measurement of analytical methods. It is also possible that the wide confidence intervals (CI) associated with NO_2 accuracy estimates are related to the fact that, for most reporting organizations, there are actually few NO_2 sites relative to the number of sites for the other pollutants. In a statistical sense, the presence of even a few relatively large, but still "acceptable", individual audit differences is magnified into large quarterly CI's due to the small number of observations actually composing the statistic.

The FY 1986-87 audit cycle is different from previous audits under the National Air Audit System in that it was carried out over a 2-year period, with approximately 50 percent of the agencies being audited in each year. The approach has both benefits and disadvantages. Overall, the advantages of the biannual cycle, reduced annual resources and added time for agencies to implement corrective actions between audits, outweigh the disadvantage of this approach. The principal disadvantage is that it is difficult to make comparisons of the 2-year audit results to other independent measures of performance, which typically are annual compilations.

Analysis of the various audit reports has indicated that the current program does not provide a good mechanism for tracking the implementation of corrective actions indicated by individual audits at the national level. Therefore, the Technical Support Division (TSD) will explore possible mechanisms to track these actions and implement tracking during the next audit cycle.

6.4 NETWORK DESIGN AND SITING

The network design and siting section of the audit was aimed at assessing air monitoring program compliance with the requirements of Appendices D and E of 40 CFR Part 58. To assess this topic, five overall aspects were reviewed:

- o Network size and written description of the network
- o Network modification during the previous year
- o Sites not meeting network design or siting requirements
- o Performance of the annual network review requirements
- o Survey of noncriteria pollutants monitored by agency.

Responses to this section of the audit were intended to provide a cross-check and update of existing EPA data on the number of monitors, their distribution, conformance with siting requirements, and compliance with the annual network review provisions. This section also provides an enhanced perspective on network stability and on the variety of noncriteria pollutants monitored by State and local agencies.

The 67 audited agencies operated 1,103 national air monitoring stations (NAMS), 2,360 State and local air monitoring stations (SLAMS), and 705 special purpose monitoring stations (SPM), a total of 4,168 sites. An indication of network stability is evident in the number of reported changes to State and local networks. There were 144 new sites established, 293 sites discontinued, and 88 sites relocated during the 1986-87 audit period, a total of 525 modifications. This total affected approximately 12 percent of the sites covered by the audit and occurred in 61 of the 67 agencies audited. During the next audit period, nearly all agencies are planning significant network changes to align their networks with the PM_{10} standards and monitoring requirements promulgated on July 1, 1987. Due to the short-term nature of SPM monitoring, no attempt has been made to track these sites regularly.

From the audit reports, it was determined that over 99 percent of the 3,463 SLAMS/NAMS operating monitors were in compliance with 40 CFR 58 Appendices D and E. There were 24 monitors listed in 14 States that did not comply with probe siting criteria of Appendix E. The most frequent cause of noncompliance was obstruction of the sampling probe by trees.

Results of the review for SLAMS network compliance and annual review requirements of 40 CFR Part 58 show that all audited agencies maintain a network description, and that the descriptions for seven agencies (or 10 percent) are deficient in one or more of the required items for the description. These seven States are repeats from the 1985 audit, and the respective Regional Offices have been alerted to take corrective action. Four agencies did not provide the date of their last annual network review. Six of the 67 agencies audited indicated that network review was a continuing process, and is covered in their annual 105 grant negotiations.

Audits of noncriteria pollutant monitoring showed that 38 of the 67 agencies monitored for one or more such pollutants. The most frequently monitored substances are organic solvents, metals, acid rain, and sulfates/nitrates. The list below shows the pollutants monitored and the number of agencies monitoring for each.

Metals	13
Acid Rain	9
Asbestos	4
Solvents	17
Formaldehyde	1
Fluoride	4
BaP	2
H_2S	5
NMOC	9
Fine Particulate	2
SO_4/NO_3	12
Sulfur	1
Phosphate	1
Radiation	1
Pesticides	1
Chloride	1
NH_3	1

6.5 RESOURCES AND FACILITIES

The resources and facilities section of the audit includes information about the magnitude of agency operations, the adequacy of resources, and the condition of monitoring and support equipment. Topics considered in this section were:

- Number of nonconforming analyzers
- Instrument needs
- Number of work-years of effort
- Documentation of standard operating procedures for laboratories and availability of necessary equipment
- Availability and traceability of laboratory and field (site) standard reference materials.

Audit results for the resources and facilities section disclosed that there are only four nonconforming pollutant monitors currently in use in the SLAMS network, less than 0.1 percent of the sites reported. All of the nonconforming monitors are hi-volume samplers for TSP, which do not conform to the new shelter standards. These instruments are being phased out as part of the conversion to PM_{10} monitoring.

Thirty-eight agencies reported specific monitoring equipment needs, ranging from spare parts to new monitors or calibration systems. Eleven agencies indicated needs for some monitors to reflect PM_{10} regulations, which were promulgated after these audits. Several agencies indicated that the equipment needs including replacements were an annual budgeted item; therefore, they did not list replacement items as needs. The equipment needs have been put in four categories: field equipment, which includes such items as pollutant monitors, flow controllers, and shelters; calibration and quality control (QC) equipment, including items such as calibration systems, gas dilution systems, and Roots meters; data processing equipment, covering such items as personal computers, data loggers, telemetry equipment, etc.; and meteorological equipment. The table below indicates the broad categories of equipment requested, the number of items, and estimated costs of acquiring the equipment. The estimated total cost to purchase all of this equipment is $1.7 million.

Equipment Type	Number of Items	$Cost (000)
Field		
Monitors	200	1,500
Shelters, flow controllers	18	85
Calibration (QC)	21	82
Data Processing	6	60
Meteorological	3	10
		1,737

Twenty agencies also requested laboratory equipment. This equipment (a total of 30 items) included spectrophotometers, humidity-controlled chambers, microbalances, etc. The estimated cost to acquire these items is $1 million. Therefore, the total cost to meet the monitoring and laboratory equipment needs identified by the audits is about $2.7 million. In March 1988, the Agency published a comprehensive report on monitoring equipment needs of air pollution monitoring agencies, titled Final Results of the 1987 STAPPA/ALAPCO Survey of the Condition of State and Local Agency Air Monitoring Equipment, March 1988. This report included responses from 45 State agencies and 150 local agencies. Approximately 73 percent of State/local agencies participated in the survey, representing areas with approximately 95 percent of the NAMS and SLAMS monitors currently in use.

The report rated the condition of air monitoring analyzers and support related equipment in terms of good, fair, and poor. "Poor" equipment is that for which repair is economically infeasible and replacement is urged. The total estimated costs of replacing equipment identified as in poor condition are $4 million for continuous analyzers and $3 million for support equipment.

Seventy-five (75) percent of the agencies felt they had adequate space to operate their program. For a better estimation of the number of people involved in air monitoring, the agencies were asked to give the number of work-years associated with operation of their monitoring programs. Sixty agencies provided tabulated responses to this question, while the remaining seven agencies either did not respond or provided organization charts that could not be related to work-years. Twenty agencies indicated a need for additional personnel. The total number of work-years assigned to four specific areas of air monitoring for the 60 agencies is shown below.

Program Area	Number of Work Years	Percent
Network Design & Siting	114	16
Resources & Facilities	271	37
Data & Data Management	167	23
QA/QC	173	24
TOTAL	725	100

The audit showed that 57 agencies, or 83 percent of those audited, have adequate laboratory standard operating procedures for air quality measurements. However, only 72 percent (48 agencies) indicated that sufficient instrumentation was available to conduct all necessary laboratory analyses. There were five questionnaires with no response to this portion.

The last topic of the facility and resource section review concerns standards and traceability of reference materials for laboratory and field site use. The audit indicated that 90 percent of the agencies had, and could demonstrate adequate reference standards for, laboratory use, and 72 percent could demonstrate standards for field use.

6.6 DATA AND DATA MANAGEMENT

The principal areas of concern in data and data management are:

- o Percentage of data submitted on time
- o Percentage of sites submitting less than 75 percent of the data

- Documentation of changes to submitted data
- Data changes performed according to a documented standard operating plan
- Completeness of the annual SLAMS report.

Each agency was asked to estimate the percentage of data submitted within 120 days after the calendar quarter in which they were collected. Although this is a requirement for NAMS sites, most agencies submit their SLAMS data to the National Aerometric Data Bank (NADB) and have included these in calculating the percentages for data submitted on time. The calculations, by pollutant, from 64 agencies show that the quarterly average percentage submitted on time varied from 71 percent for lead to 90 percent for TSP. These percentages are in general agreement with those reported quarterly in the July 1987 NAMS Air Monitoring Station Network Report.

The audits also examined the percentage of sites meeting the NADB data completeness criteria (in general, submitting at least 75 percent of the possible data by quarter by pollutant). The 66 agencies' responses on data completeness were combined as a national quarterly average data completeness and were compared to the 1985 annual percentages from the July 1987 Quarterly NAMS Status Report.

Percent of Sites Meeting NADB Criteria

Pollutant	Audit Results	1985 Annual
TSP	93	93
SO_2	86	92
NO_2	73	78
CO	93	90
O_3	94	88
Pb	86	94

Considering that the national audit results reflect a quarterly average of approximately 4,000 sites, and the NAMS report is an average for approximately 1,300 sites, the two data sets compare reasonably well in that the difference range is from 0 (for TSP) to 8 percent (for Pb).

The audit indicated that 58 (85 percent) of the audited agencies documented permanently any change to air quality data previously submitted to EPA, and that 55 agencies (82 percent) performed these changes according to a documented standard operating procedure.

The last area considered under the data management section of the audit was the requirement to submit an annual SLAMS report to EPA. This requirement is applicable to States, the District of Columbia, and U.S. territories, so local agencies are not considered here. Four particular aspects of the SLAMS annual report are needed for a complete SLAMS report: a data summary, annual precision and accuracy information, air pollution episode information, and certification of the report. Of the 45 audited agencies that are required to produce a SLAMS annual report, 36 (80 percent) showed inclusion of all required elements, while the remaining 9 were deficient in one or two elements of the report. The most frequently missing items were episode reporting and precision and accuracy data. The requirement for submission of precision and accuracy data in the annual SLAMS report was not removed from the regulations until May of 1986 and was not a significant factor in these audits. These results are comparable to findings based on those annual reports received by the Office of Air Quality Planning and Standards (OAQPS).

6.7 QUALITY ASSURANCE/QUALITY CONTROL

The Quality Assurance/Quality Control (QA/QC) section of the National Air Audit System is the last major topic addressed in the audits. The following portions of the agencies' QA/QC programs were examined:

- EPA approved QA plan
- Pending revisions to QA plans
- Agency participation in the National Performance Audit Program (NPAP)
- Attainment of precision and accuracy goals.

Several years ago, EPA completed its approval of State Quality Assurance Program plans. As a result of program reviews, and of the changing state of the art, some agency QA programs are outdated or need modification. This is evidenced in the audit results showing that 3 out of the 67 audited QA plans need major revisions and 32 (48 percent) have initiated formal revision proposals concerning minor matters. At the time of the audits, two of the three needing major revisions were scheduled for the next fiscal year or were otherwise in progress. Participation in the NPAP was very good, with 64 of the 67 audited agencies participating.

The last consideration of the QA/QC section of the national audit was an evaluation of the ability of the agencies' reporting organizations to meet the precision and accuracy goals specified in the FY 1986-87 audit guidance (precision, ±15% for all pollutants; accuracy, ±15% for TSP, ±20% for all other pollutants, using audit level 2 for accuracy).

Precision and accuracy data are measures of data quality and are based on "reporting organizations". Each State must define at least one or more reporting organization for each pollutant, and each reporting organization should be defined such that the precision and accuracy data reported among all stations are reasonably homogeneous. Nationally, there are approximately 150 organizations.

Sixty-three (63) agencies provided responses on precision performance in a comparable format, while accuracy data were supplied by 62 agencies. Some of the agencies that did not provide comparable responses for this section did provide some indications of achieving or failing to achieve the goals. The FY 1986-87 audit guidance directed that achievement of goals was to be determined on each of the last four complete calendar quarters for which precision and accuracy data were available, covering the period October 1984 through December 1986. Since no common time period was available for all agencies, the four quarters during which each reporting organization provided data on precision goals were summed. Similarly, a summation of the accuracy goals achievement was prepared. The results of this tabulation, by pollutant, are presented in Table 6.1 for precision and in Table 6.2 for accuracy.

Achievement of precision goals by reporting organizations, as shown in Table 6.1, varied from 55 percent for lead to a high of 88 percent for CO. Similarly, the achievement of accuracy shown in Table 6.2 ranges from 65 percent for NO_2 to 84 percent for Pb. It is evident that NO_2 accuracy falls considerably below the level achieved by other pollutants and this has been attributed to the complexity of the $NO/NO_2/NO_x$ analyzer. It is also possible that the wide confidence intervals associated with NO_2 accuracy estimates are related to the fact that, for most reporting organizations, there are few NO_2 sites relative to site counts for the other pollutants. In a statistical sense, the presence of even a few relatively large, but still "acceptable", individual audit differences are magnified into large quarterly confidence intervals because of the small number of points actually composing the statistic.

To provide further perspective on precision and accuracy performance nationally, Table 6.3 for precision and Table 6.4 for accuracy have been assembled from data submitted to EMSL for calendar year 1986.

TABLE 6.1

FY 1985 AUDIT RESULTS FOR DATA PRECISION

Pollutant	Reporting Organizations (Rpt. Orgs.)	Rpt. Orgs. Quarters Meeting Goals	Percent Success at Meeting Goals
O_3	83	287	87
NO_2	50	131	66
SO_2	85	241	73
CO	74	260	88
TSP	109	294	67
Pb	66	146	55

TABLE 6.2

FY 1985 AUDIT RESULTS FOR DATA ACCURACY

Pollutant	Reporting Organizations (Rpt. Orgs.)	Rpt. Orgs. Quarters Meeting Goals	Percent Success at Meeting Goals
O_3	82	266	81
NO_2	49	127	65
SO_2	84	240	71
CO	73	231	79
TSP	108	355	82
Pb	65	217	84

TABLE 6.3

PRECISION OF 1986 DATA SUBMITTED TO EPA

Pollutant	Rpt. Orgs.	Probability Limits (%) Lower	Upper	Percent of Rpt. Orgs. Meeting Goal ± 15%
O_3	75	-14	+12	93
NO_2	59	-19	+20	80
SO_2	103	-19	+14	86
CO	90	-12	+13	95
TSP	136	-17	+19	80
Pb	68	-28	+30	66

TABLE 6.4

ACCURACY OF 1986 DATA SUBMITTED TO EPA (AUDIT LEVEL 2)

Pollutant	Rpt. Orgs.	Probability Limits (%) Lower	Upper	Percent of Rpt. Orgs. Meeting Goal ± 20%*
O_3	98	-14	+15	96
NO_2	40	-18	+16	94
SO_2	82	-19	+18	93
CO	68	-12	+12	98
TSP*	127	-11	+12	95
Pb	68	-12	+10	98

*TSP is based on ±15%.

Tables 6.3 and 6.4 utilize the entire 1986 data base. The upper and lower probability values were selected so that the range would include 90 percent of the reporting organizations for precision and accuracy (audit level 2). The last column reflects estimates of the percentage of reporting organizations meeting the audit goals for 1986 precision and accuracy data submitted to EMSL. The number of reporting organizations meeting the audit goal of ±15 percent for precision ranges from 66 percent for Pb to 95 percent for CO. The goals for accuracy were ±15 percent for TSP and ±20 percent for all other pollutants. The range of reporting organizations achieving the accuracy goals in Table 6.4 is from 93 percent for SO_2 to 98 percent for CO and Pb.

Tables 6.1 and 6.3, or 6.2 and 6.4, are not directly comparable with each other, because the period of record for the agencies audited could not be equated to a single quarter or year and because the number of reporting organizations used is not the same. However, based on 1986 annual data submitted to EMSL, the goal achievement rate is higher for all pollutants for precision and accuracy than that indicated by the agencies audited. Furthermore, the extent of the range (the percent of reporting organizations meeting the precision and accuracy goals) in Tables 6.3 and 6.4 is smaller than in Tables 6.1 and 6.2.

Since the 1985 audit reports, significant national improvements in the NO_2 precision and accuracy summary measurements (Tables 6.3 and 6.4) have been observed. The percentage of reporting organizations meeting the NO_2 precision goal has increased from 75 to 80 percent, while the accuracy percentages have improved by 24 percentage points, from 70 to 94 percent.

The reasons for the rather low percentage of audited agencies meeting the precision and accuracy goals (Tables 6.1 and 6.2) for NO_2 are not entirely clear, but the low achievement level for lead precision is believed related to the procedure, which analyzes two strips from the same filter. This may occur because of variable Pb content across the length of the filter, handling losses, or inconsistency in cutting filter strips. A review of Pb precision data from 1982 through 1986 shows little improvement over the period. Consequently, it appears that the selected precision goal of ±15 percent is too rigorous, and that some consideration to relax this goal is warranted. This matter has been referred to the appropriate groups in OAQPS and EMSL. Preliminary findings indicate that the Agency will be adjusting the precision and accuracy goals for lead.

CHAPTER 7

MOTOR VEHICLE INSPECTION/MAINTENANCE

7.1 EXECUTIVE SUMMARY

By the end of FY 1987, there were inspection and maintenance (I/M) programs in 33 states. During FY 1986 and FY 1987, EPA conducted 33 program audits. The audit findings summarized in this report confirm the validity of findings of audits performed during FY 1985 and provide further evidence that I/M is a reasonable and effective strategy for reducing tailpipe emissions of vehicles in use.

The audits also provided convincing evidence that the most effective I/M program design is the centralized design, while the weakest program is the decentralized program with manual analyzers. In fact, audits showed that programs operating with a decentralized design and manual analyzers were so significantly inferior in identifying failing vehicles and in achieving the minimum emission reductions required by EPA, that the Agency requested corrective action from the Governors of seven States with this type of program.

Other problems documented during the first round of auditing were encountered again in the audits in FY 1986 and FY 1987. High waiver rates, ineffective use of program data for program management, lack of quality control and consistency of testing in decentralized programs, and enforcement problems in sticker enforced programs were problems identified during both the first and second round of audits. EPA also identified some problems with using license or registration suspension as a means of enforcement.

Certain problems were found to be widespread among programs and EPA has conducted several special studies to develop reasonable solutions to technical problems identified in operating programs. EPA has also, based on audit results, developed and revised policies to assist State and local governments in resolving problems and to prevent problems from occurring. Much of EPA's proposed Post-1987 Ozone and Carbon Monoxide Policy as it relates to I/M is based on lessons learned from auditing operating I/M programs.

While EPA still believes that the resolution of certain problems generally rests with each I/M program, audit results make it clear that differently designed programs do not realistically have equal benefit potential. Resolution of certain problems rests with changing program design. It is not likely that additional monitoring or administrative control will be sufficient to resolve problems associated with decentralized manual inspections. The audit results also indicate that decentralized tampering inspections may lack the impartiality, consistency, and accuracy needed to achieve sufficient benefits. Given the strength of the audit findings, EPA favors the centralized program design over the decentralized design. In addition, EPA believes that registration denial enforcement is more effective than sticker based systems.

7.2 INTRODUCTION

The primary purpose of I/M audits is to ensure that each State or locality is implementing and enforcing its I/M program in a manner consistent with its State implementation plan (SIP). A second objective of the audit process is to identify areas where EPA can provide assistance to strengthen I/M programs. The I/M audit questionnaire and audit visit are structured to obtain operating data and qualitative information to allow EPA to determine if SIP goals and commitments are being met.

In FY 1986, the Technical Support Staff developed and computerized a methodology to assess program performance in terms of emissions benefits against SIP design and minimum requirements. Using this methodology, EPA calculates the expected program benefit assuming no operating problems, disaggregates that benefit into its component parts of tampering deterrence, emission reductions from tailpipe checks, and emission reductions from the tampering check. The benefits are then adjusted to reflect improper testing, waivers, and enforcement problems. If the analysis shows that the benefit from an operating program falls below the required minimum emission reduction, EPA formally requests a plan of corrective action from the State. The corrective plan requires States to resolve program problems within 9 months to a year or face funding restrictions as required by the Clean Air Act. Based on the FY 1986-87 audits, EPA has requested corrective plans from 12 I/M programs.

Sixteen (16) audits were conducted in FY 1986 and 17 in FY 1987. Eight of these audits were follow-up audits of programs that had received initial audits in FY 1985. Three programs, in Indiana, Georgia, and Davis County, Utah, were audited twice in the FY 1986-87 timeframe. Twenty-three initial audits were conducted so that by the end of FY 1987, all programs that had been operating for 1 year or more had received an initial program audit. Tables 7.1 and 7.2 list the I/M programs audited in 1986-87 along with the dates of each audit.

7.3 MAJOR FINDINGS AND CONCLUSIONS

Audit Results

Detailed results of each program audit are contained in full audit reports written jointly by EPA Regional and Headquarters staff. Table 7.3 summarizes the audit findings by program type. The principal findings can be described as follows:

TABLE 7.1

FY 1986 I/M AUDITS

Location	Dates
Utah (Davis and Salt Lake Counties)	10-7 to 10-10
Nashville, Tennessee	1-5 to 11-7
Maryland	11-19 to 11-21
Georgia (follow-up)	1-29 to 1-30
California	1-27 to 2-6
Seattle, Washington	2-24 to 2-28
Louisville, Kentucky	3-04 to 3-07
Pennsylvania	3-10 to 3-13
Indiana	3-18 to 3-21
Houston, Texas (follow-up)	4-28 to 5-02
New York (follow-up)	6-11
Georgia (follow-up)	6-11 to 6-12
Memphis, Tennessee	6-16 to 6-18
Massachusetts	7-07 to 7-11
Fairbanks, Alaska	8-20 to 8-22
Anchorage, Alaska	8-25 to 8-27
Connecticut	9-23 to 9-25

TABLE 7.2

FY 1987 I/M AUDITS

Location	Dates
New Jersey (follow-up)	11-17 to 11-21
Louisiana	12-01 to 12-05
Indiana (follow-up)	1-12 to 1-14
Provo, Utah (preliminary evaluation)	1-15 to 1-16
Tulsa, Oklahoma	2-09 to 2-12
Michigan	3-10 to 3-12
District of Columbia (follow-up)	3-22
Nevada (follow-up)	3-27
Dallas, Texas	3-30 to 4-03
Missouri (follow-up)	5-04 to 5-07
Illinois	5-11 to 5-14
El Paso, Texas	6-01 to 6-05
Provo, Utah	8-10 to 8-12
Davis County, Utah (follow-up)	8-12 to 8-14
Spokane, Washington	9-21 to 9-24

TABLE 7.3

I/M DATA COLLECTED DURING FY 1986-87 AUDITS

Program	Failure Rate %	Compliance Rate %	Waiver Rate %	Tamper Test Problems	Quality Assurance Problems
DECENTRAL MANUAL					
Georgia (86)	4	63	?	Yes	Yes
Georgia (87)	7	93	22	Yes	Yes
Boise, Idaho	9	98	3	Yes	Yes
Missouri	9	95	23	Yes	Yes
Nevada	11	95	40	NA	Yes
New York	5	98	?	Yes	Yes
Davis County, Utah	10	95	25	Yes	Yes
Provo, Utah	18	95	10	No	No
Salt Lake City, Utah	10	95	20	Yes	No
DECENTRAL COMPUTERIZED					
California	25	95	19	Yes	Yes
Pennsylvania	18	94	4	NA	No
Fairbanks, Alaska	19	95	20	Yes	Yes
Anchorage, Alaska	15	95	10	Yes	Yes
Michigan	22	95	13	NA	Yes
El Paso, Texas	?	?	?	Yes	Yes
CENTRAL GOVERNMENT					
District of Columbia	?	18	100	NA	Yes
Memphis, Tennessee	8	66	0	NA	Yes
New Jersey	20	95	NA	Yes	No
CENTRAL CONTRACTOR					
Connecticut	12	93	14	NA	No
Illinois	21	73	10	NA	No
Indiana	24	50	20	NA	No
Louisville, Kentucky	16	100	19	NA	No
Maryland	15	99	20	NA	No
Nashville, Tennessee	24	95	NA	NA	No
Seattle, Washington	17	94	17	NA	No
Spokane, Washington	18	78	14	NA	Yes
TAMPERING ONLY					
Houston, Texas	?	95	NA	Yes	Yes
Louisiana	?	85	NA	Yes	Yes
Tulsa, Oklahoma	?	95	NA	Yes	Yes
Dallas/Ft. Worth, TX	?	98	NA	Yes	Yes

NA = Not applicable, waivers are not issued or tamper checks are not performed as part of the initial test.

? = Unknown, usually due to lack of data analysis on the part of the program.

1) Improper Testing - All manual decentralized programs had much lower than expected failure rates as a result of improper testing. Audit results showed that failing vehicles were not being properly identified in these programs, due to inspector malfeasance or incompetence. Serious emission reduction shortfalls resulted in all but two areas with programs using this design.

   Tampering inspections in decentralized programs also suffered from improper inspection. Auditors found that inspectors often failed to perform tampering inspections correctly or neglected them entirely. Roadside surveys conducted by EPA confirmed these findings.

2) Enforcement - As in the earlier audits, EPA found a range of compliance rates from 50 percent to greater than 95 percent among programs. The lowest rates were in sticker enforced programs and in some programs with driver's license or registration suspension.

3) Waiver rates - EPA auditors found that waiver rates varied among programs. Excessive waiver rates were found in programs that did not have adequately administered waiver processes or had too low a cost requirement for the waiver.

4) Quality control and quality assurance - FY 1986-87 audits showed that analyzer and inspection quality control were excellent in the centralized, contractor-run programs. The decentralized programs had more problems with both QC and QA in general, and these problems were quite severe in most decentralized manual programs and decentralized tampering programs.

5) Data analysis - The centralized, contractor-run programs for the most part had the best data and data management capabilities. Audits showed that a few of the more sophisticated decentralized programs captured and used program data for management purposes, but most decentralized programs lacked reliable data with which to effectively evaluate and manage program operations. The audits also revealed that the data from the decentralized manual programs and decentralized tampering programs were in most cases completely unreliable.

6) Quality of I/M Repairs - Most programs lack the data to seriously evaluate the quality of I/M repairs. However, EPA did find that assuring quality repairs was beyond the scope of most programs.

   The high waiver rates in many programs and the small reductions obtained from waived vehicles indicated the failure of vehicle repair. Repair studies conducted under EPA contract showed that vehicles failing I/M programs can be successfully repaired at higher rates than EPA audits indicated was the case in the field.

National Program Management

EPA has made an effort to integrate audit findings into policies that will result in more effective I/M programs. The first step in this process was requiring programs with shortfalls to correct program deficiencies. The second step was using the knowledge gained through the audits to design the Agency's Post-1987 Ozone and Carbon Monoxide Policy, which was proposed in the Federal Register on November 23, 1987. EPA also revised the National Air Audit Guidance to reflect the FY 1986-87 audit experience.

Correcting Operating Problems

Program design is the basis for improper testing problems and some enforcement shortfalls. EPA believes that certain problems can be resolved through tightening of administrative procedures; however, problems serious enough to cause emission reduction shortfalls may require program design changes. Programs with a decentralized design using manual analyzers have so many problems in the field that EPA no longer finds this design approvable. While using computerized analyzers mitigates some of the problems of the decentralized design, it does not solve all of the problems. The decentralized approach does not allow for consistency in either tampering or emissions checks, quality control is more difficult than in the centralized network, and data collection is less reliable. Audit results lead EPA to conclude that registration denial is more effective than either registration/license suspension or sticker enforcement.

Future I/M Audit Policy

The consolidation of audit results from FY 1985 to FY 1987 is reflected in the Agency's proposed Post-1987 Ozone Policy. Under this policy, the minimum emission reduction requirement for areas with severe air quality problems is based on a centralized program design and assumes 100 percent enforcement. In the future, if a waiver provision is included in the program, the SIP will have to include a commitment to a waiver rate, which will be factored into the program benefit. Previous program operating results, including enforcement levels and reported failure rates, will also be taken into consideration in determining the program benefit. To encourage better and more uniform data management and application, EPA will require programs to report certain statistics on a biannual basis. EPA will continue to audit programs on a regular basis, incorporate audit findings into policy, and work through the audit process to ensure that SIP commitments are met.

7.4 REPORTED FAILURE RATES/IMPROPER TESTING

EPA auditors found that failure rates varied with program design. The FY 1985 audits had shown reported failure rates in decentralized manual programs, such as Virginia and North Carolina, to be consistently lower than the design failure rates. Eight decentralized manual programs were audited in FY 1986-87. All but three of these programs, in Boise, Provo, and Salt Lake City, had failure rates so low that emission reduction levels fell below the minimum emission reduction requirement.

The primary reason for the low failure rates was found to be improper testing. In some cases, vehicles may have been undergoing pre-inspection repair. However, in most cases, inspectors were making mistakes in testing, failing to test the vehicle, or intentionally passing a vehicle that should fail. The overwhelming evidence accumulated through the audit process has lead EPA to be skeptical about its previous position that manual decentralized programs can be successful under a rigorous program of surveillance. Regular station audits, extensive undercover auditing, and a data analysis capability that allows the tracking of station performance are essential for even marginal success in a decentralized program using manual analyzers. Size is another important factor in the success of decentralized programs. The larger programs cannot maintain the personal contact with stations exhibited in the smaller, more successful programs. The Boise, Provo, and Salt Lake City programs are small, well managed programs that meet the minimum emission reduction requirement but still fall below the expected results, given the program coverage and cutpoints. EPA believes that the basic problems with the decentralized manual approach are so intractable that no future programs with this design will be approved for SIP credit.

Auditors found that to some degree the use of computerized analyzers mitigated the effects of the decentralized design on improper testing. Failure rates in decentralized programs using computerized analyzers were usually close to, although generally slightly below, the design failure rate range, with a few notable exceptions. The New Jersey program, which has both centralized, State-run testing facilities and licensed decentralized stations using computerized analyzers, reported a failure rate of 7.3 percent in the decentralized stations.

This compares to a reported failure rate of 20.3 percent in the centralized stations. (These reported figures were not well documented, and further investigation may find valid reasons for some of the disparity.) Improper testing in computerized programs requires greater effort on the part of the inspector, but is possible. Most computerized programs do not do all the data analysis or covert auditing they could to detect, quantify, and pursue suspected cases of improper testing. The proposed Post-1987 Ozone and CO Policy addressed these issues.

Some of the problems that could mask improper testing in decentralized stations with computerized analyzers were reported. It is possible to produce computer-generated test records showing a pass for a failing vehicle by entering into the analyzer the proper identifying information for the vehicle but then testing another that is a known pass. Some programs experienced data loss as a result of the use of cassette recording media in computerized analyzers. Part of this problem could stem from deliberate tampering with cassettes or the recording media to avoid detection of improper issuance of a certificate of compliance.

EPA found that all centralized contractor-run programs had failure rates within the range of expected results. Two centralized, locally run programs, the District of Columbia and Memphis, were audited and both were found to have low failure rates. The District addressed this problem by installing computerized analyzers. Auditors found that the cutpoints in the Memphis program were very loose and the inspectors in some cases were not inspecting vehicles properly. The standards have now been tightened and two new stations with modern equipment have been installed.

7.5 ENFORCEMENT

As in earlier audits, EPA auditors found that the rate of compliance varied from program to program, with rates ranging from greater than 95 percent to a low of 50 percent. Of the 30 programs audited, 7 programs had serious enforcement shortfalls (see Table 7.3).

Three enforcement methods are currently used in I/M programs: sticker enforcement, registration denial, and data-link enforcement. The problems with sticker based enforcement programs found in the FY 1984-85 audits were found again in the FY 1986-87 audits. These problems include inadequate sticker accountability, inability to easily identify subject vehicles, inability to distinguish expired stickers from valid ones, and failure of police departments to devote the necessary resources to enforcement of the testing requirement.

A sticker enforced program must have complete sticker accountability procedures that are rigorously followed in order to be effective. To ensure the proper disposition of stickers, government agencies must confirm that each sticker has a matching inspection record showing a passing score. In decentralized programs, this process of accountability is very resource intensive, requiring correlation of sticker serial numbers to inspection reports and manual review of inspection records, sticker records, and sticker supplies during audits. It also requires a process of sticker distribution that allows auditors to track (by serial number) inspection stickers issued to each inspection facility. EPA found that in most programs, sticker accountability systems are well designed and implemented. On the other hand, the New York program had as many as 800,000 stickers for which no test record was found. Part of this problem stems from data loss due to use of cassettes, but EPA found that the New York auditors did not systematically check for sticker problems during audits and stickers were being issued without tests.

In programs where registration denial is used as the mechanism for enforcing the program, few problems have been identified. EPA audited 16 programs that use registration denial enforcement in FY 1986-87. In some cases, the estimates for subject vehicles were rough, making accurate calculation of compliance rates difficult. However, all but three programs appeared to have compliance rates in excess of 94 percent. The complex geographic coverage of the I/M area and problems with the decentralized and largely unsupervised registration system resulted in low compliance in the Spokane I/M program. The Memphis and Atlanta programs also had low compliance rates, which appeared to be related to loopholes during the phase-in period of new registration denial systems.

During FY 1986-87, EPA conducted the first audits of programs using the computer matching method of enforcement. These programs differ in design details, but all rely on matching test records with registration data on subject vehicles. When noncomplying vehicles are identified, vehicle owners are notified. If vehicles are not subsequently tested, then vehicle registrations are suspended or the vehicle owner receives a citation to appear in court. Illinois is different in that it suspends the non-complying vehicle owner's driver's license.

Of the four programs that rely solely on computer matching, the Maryland and Louisville, Kentucky programs worked well. In both programs, compliance rates were near 99 percent. Non-complying vehicles were usually brought into compliance within 3 months of notice of violation.

In Illinois and Indiana, auditors found severe problems with the computer matching enforcement. The computer matching system of enforcement requires inter-agency cooperation, an accurate up-to-date registration data base, and substantial computer-related resources. The Illinois system is complicated by the addition of driver's license data. The notification and suspension process has taken much longer than the scheduled 7 months. Often, vehicles that are found to be out of compliance have been sold, the registration data base does not reflect the sale, and driver's licenses are improperly suspended. The Indiana program had the lowest compliance rate in the country in 1986-87 and continued to experience difficulties with system design, dedication of resources, and inadequate inter-agency cooperation in enforcing the program.

After 4 years of auditing I/M programs, EPA has found that the sticker enforcement program design is less effective and more resource intensive (if conscientiously executed) than the registration denial method of enforcement. Of all the sticker enforced programs audited, almost half had problems. Sticker enforcement is less difficult to implement in terms of identifying subject vehicles where the I/M program is statewide. However, problems with sticker accountability, inadequate police resources, and low priority for enforcing the program remain. It is clear that computer matching enforcement can be as effective as registration denial, but the resources required to implement such a complex system make it less favorable than simple registration denial.

7.6 WAIVERS

EPA auditors found that waiver rates varied considerably among the programs audited. The highest waiver rate was 40 percent and the lowest was 2 percent. Unless there was a carefully administered waiver system, waivers tended to be a weakness in all programs that allow them.

To some extent, excessive waivers varied with program design. In programs where the administering agency processes all waiver applications (many centralized programs, a few decentralized), the reason for high waiver rates tended to be lenient requirements. Vehicles receiving improper or poorly-performed repairs were granted waivers as long as the repair cost limit was reached. It is not unusual for retest scores on failed vehicles to remain the same or increase as a result of such repairs. Repair cost limits were often inadequate to ensure that vehicles received the basic repairs needed to bring the vehicle into compliance. In addition, vehicles eligible for warranty coverage could get waivers without ever having sought a free warranty repair, and owners of failing vehicles were allowed to do their own repairs and receive a waiver even if the repairs were inadequate. Repairs done by vehicle owners were often ineffective and, in one program that had data available, about one-third of the waivers were from this group, a disproportionately large percentage. Finally, not all commercial repairs were appropriate for the cause of the I/M failure.

In decentralized programs, where the inspection stations usually have the authority to grant waivers, high waiver rates are also caused by a lack of control over the waiver process. In these cases, State or local agencies did not track waiver rates by inspection station and did not investigate questionable waiver transactions. In some decentralized programs, the waiver rates were surprisingly low. In some cases, the rates were so low (less than 2 percent) that it reinforced the suspicion that vehicles are not being correctly failed at reinspection. As in centralized programs, a low waiver cost limit usually meant a higher waiver rate.

EPA has run several test programs in which failing vehicles have been recruited from I/M programs. Results of these studies indicate that most vehicles can be repaired successfully for reasonable costs. Based on these findings, EPA recommends that cost waiver limits be increased to $200 for 1981 and later vehicles, and to $75 for pre-1981 vehicles. The typical cost waiver limit found in I/M programs is $50 or $75. However, anti-tampering programs typically do not allow cost waivers for the repair or replacement of tampered components. In addition to raising the cost limit, other factors must be considered in controlling waivers. Proper administrative procedures must be followed in granting waivers and no waiver should be granted where there is no decrease in emissions (EPA recommends that at least a 20 percent reduction be required). Bringing pressure on the repair industry to perform proper repairs is difficult, but some agencies are dealing with the repair industry where repairs from a facility are consistently ineffective. EPA believes that the waiver process and monitoring of repairs is most easily managed in the centralized program where the government oversight agency is responsible for approving waivers.

Centralized waiver processing provides the opportunity for intervention in the repair process. For example, Louisville requires all owners of failed vehicles to present a completed repair form at the time of the retest. The data required include the name of the repair facility, repairs conducted, and the cost. Program officials periodically publish data on each repair facility involved in I/M repair. The data published show the number of vehicles repaired, the number that pass and fail the retest, and the number that experience no emission improvement at all. Program officials report that this has had a very positive impact on the repair industry. The approach used in the Milwaukee, WI program (audited in FY 1985) is to track repair facility performance. When a facility is returning too many vehicles that fail the retest, program officials visit the facility, encourage the mechanic(s) to take advantage of training available through local colleges, and provide assistance in analyzer calibration and testing. Another control used in some centralized programs is to physically check the vehicle to see if repairs were actually performed and also to check for tampering with emission controls. These strategies are effective in preventing abuse of the waiver system and insuring that emission reductions are not lost without justification.

In the past, EPA has calculated SIP credits under the assumption that all vehicles failing an I/M test are successfully repaired. Since overall average emission reductions do not usually occur among vehicles given waivers, EPA now considers waiver rate in analyzing current program success and evaluating future program designs. In the future, EPA will ask programs to commit to a design waiver rate for the purpose of calculating SIP credit.

7.7 QUALITY CONTROL

Quality control (QC) is used here to refer to the quality enhancing practices of the person or organization doing vehicle inspections. The centralized, contractor-run programs for the most part had excellent quality control. The most common problem found in these programs was poorly named calibration gases, but the degree of error was always small (within a few percentage points). Quality control tended to vary considerably among centralized, government-run programs. In addition to problems with calibration gases, these programs in some cases had poor QC practices, especially as they relate to the frequency of checks. Quality control in decentralized manual programs tended to be extremely poor. Often, over 50 percent of the analyzers checked were found out of calibration in these programs. It was found that quality control procedures are not typically followed by inspection stations. In decentralized programs with computerized analyzers, QC was found to be much better than manual programs, but not up to the level expected. Typically, about 25 percent of the analyzers checked in computerized programs failed the calibration test. Some of this was due to station gas quality but, in most cases, this was not the cause. EPA is concerned at this point that weekly calibrations, which are required in all decentralized programs, are not frequent enough to ensure reasonable quality control. This issue will be pursued further to assess the causes and possible mitigations.

7.8 QUALITY ASSURANCE

Quality assurance (QA) refers to the practices of the persons, agency, or organization one level removed from the actual conduct of inspections. Quality assurance is fundamentally different in centralized and decentralized programs. Centralized, contractor-run programs generally required only minimal quality assurance on the part of the oversight agency. Generally, the QA done involved weekly or monthly visits to inspection sites to observe testing, to check analyzer calibration, and the like. As stated above, the level of quality control in these programs was exemplary and this is due in part to the vigilance of oversight agencies. Also, in most such areas there is a degree of hostility by some members of the public and legislators toward the contractor, and so the contractor is careful to avoid incurring legitimate negative criticism. In centralized, government-run programs, both the level of quality control and the effectiveness of quality assurance were uneven and, in one or or more cases, very poor. In most cases, these programs have split responsibilities between the air agency and the motor vehicle agency, with the latter doing the testing and implementing quality control procedures and the former responsible for quality assurance. In some cases, little or no quality assurance was being conducted by the air agency and this was usually reflected in the results of EPA's analyzer audits. In some cases, the QA procedures were not entirely adequate. For example, loose audit tolerances were found in some programs (e.g., ±10% as opposed to the +5/-7% recommended by EPA). Also, other QA practices were not used in some cases, such as observing inspectors testing vehicles and processing forms. Even when the air agency is following good quality assurance practices, its ability to obtain quality control corrections by the motor vehicle agency may be low, since the only official with authority over both agencies may be the Governor.

In decentralized programs, quality assurance ranged from poor to excellent. The major problems included inadequate procedures and guidelines for auditors, failing to follow through once problems were found, and poor tracking of station performance. Audit procedures often departed from EPA's basic policy requirement that auditors check to see that all program rules and regulations are being followed. The most important feature of this is to observe an inspector actually doing an inspection. When this important practice was followed, problems were often found. More importantly, most programs imposed lenient penalties or only gave out warnings for infractions. In a few cases, the administrative process or legal barriers discouraged or prevented more effective penalties but, more often, the problem was a lack of will on the part of the oversight agency to suspend or revoke station and inspector licenses. Even once licenses are suspended, the length of suspension was often too short to be a meaningful deterrence. Good QA programs generally included very thorough overt audits conducted quarterly (or monthly in manual analyzer programs) and periodic covert audits using vehicles set to fail the emission and anti-tampering inspection. Another positive feature of good quality assurance programs was tracking of station performance through the use of very organized, often computerized, recordkeeping.

7.9 DATA ANALYSIS

EPA auditors found that with a few exceptions decentralized programs, especially programs collecting data manually, were failing to effectively use program data to monitor program performance. Centralized programs were doing a better job where the programs were managed by a contractor who made use of data and provided reliable data to the oversight agency. In all of the centralized programs, the data were at least available to construct meaningful program statistics. This was not the case in most decentralized programs audited, where data loss was found to be a common problem.

Audits showed manual data collection in decentralized programs, both tailpipe and tampering, to be so unreliable that nothing meaningful can be extrapolated from the data. Records are often illegible and therefore unusable. Many inspectors also do not record the data correctly. EPA found, as it did in earlier audits, that manually collected data sometimes contained easily identifiable patterns of record falsification.

EPA found that the data collected varied from program to program, as did definitions and calculation of reported statistics. This lack of uniformity and the inability of programs to use available data illustrate the need for stronger direction from EPA for future reporting requirements.